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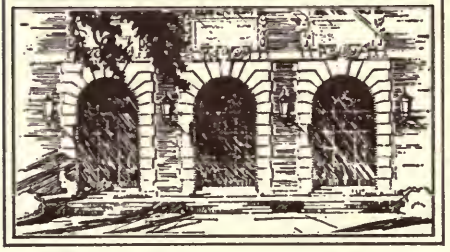

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FLORA OF PERU

BY

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CURATOR, PERUVIAN BOTANY

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FLORA OF PERU

J. Francis Macbride

GERANIACEAE. Geranium Family

Reference: Knuth, Pflanzenreich IV. 129. 1912.

Annual or perennial herbs or, less frequently, suffrutescent with opposite or alternate often bistipulate and more or less dentate lobed or divided, rarely entire, leaves. Pedicels axillary, 1- or 2-flowered or flowers subumbellate. Sepals persistent. Flowers hermaphrodite, usually regular with 5 sepals and petals, these rarely 4, or the latter lacking in *Rhynchotheca*, mostly equal, imbricate. Stamens 2 (3) times as long as the sepals, 10 or by abortion 2, 7, or 9 often 5, alternate ones not antheriferous; filaments rarely completely free. Ovary 3–5(2–3)-lobed, the 5 styles united around a produced axis to form a torus or beak, free at tip with narrow stigmas. Ovules pendulous, 1, 2 or many in each cell. Fruit usually 5 one-seeded carpels that when ripe spring away from the elongate central axis and bear the twisted or coiled styles as "tails" or less frequently these are short, straight and remain attached at tips or the fruit may be even capsular, 5-valvate, the valves not at all caudate.

Herbs; carpels revolutely caudate, in fruit "tailed."

Stamens with anthers 10; carpel-tails glabrate; leaves often palmately lobed or parted.....1. *Geranium.*

Stamens with anthers 5; carpel-tails bearded; leaves usually pinnate.....2. *Erodium.*

Shrubs; carpels ecaudate or the beak erevolute.

Petals none (or obscure); mature fruit 5 caudate carpels. 3. *Rhynchotheca.*

Petals 5; mature fruit capsular with parting but ecaudate valves. 4. *Balbisia.*

1. GERANIUM [Tourn.] L.

Herbs, annual or perennial, in Peru often cespitose and tufted or matted, sometimes diffuse. Leaves alternate or opposite, stipulate, usually orbicular-reniform, variously palmately lobed or divided. Flowers 5-merous, actinomorphic, on axillary peduncles, the sepals and petals imbricate, the former persisting, the latter deciduous and

alternate with 5 glands. Stamens 10 (5), hypogynous, 5 longer alternating with 5 shorter, the filaments basally united if at all. Ovary deeply 5-lobed, 5-carpellate. Styles glabrous within, elastically recoiling when mature and recurving on the 2-ovuled, 1-seeded carpels.

The following synopsis was basically compiled before the discriminating account of the Mexican species by H. Emery Moore, Jr., Contr. Gray Herb. 146. 1943, came to my attention, but I have followed him in his identification of *G. mexicanum* and in noting the petal-venation in the few Peruvian species in which this useful character, as he pointed out, has been discernible. Several of the Peruvian species are based upon incomplete material and until the type localities are revisited their interpretation would seem to be largely guesswork; I have therefore preferably retained names that I could identify, restricting the others to their originals. As usual in this work the characters used in the key have been dictated at least in part by expediency. The descriptions are mostly after Knuth.

Species of *Pelargonium* L'Hér. of Africa, similar to *Geranium* except that the showy flowers lack the five glands and are somewhat irregular, are often cultivated as "Geraniums," and, as in warmer North America, may persist as adventives; for Peru, *Pennell 14696* from along the Río Chillón, Lima, is an example. The "Rose Geranium" of gardens is a *Pelargonium* and is a source of some geranium oil important in perfumery.

Densely cespitose alpines, acaulescent or essentially and forming mats or polsters, or diminutive and imbedded in puna formation.

Leaves never argenteously sericeous both sides, rarely strigosely subsericeous, often merely ciliate marginally and on veins or somewhat pubescent beneath.

Leaf-divisions all with at least 3 linear segments that are clearly longer than broad.....*G. Humboldtii.*

Leaf-divisions at least in part entire, broadly lobed or dentate.

Leaves completely glabrous, the lobes entire and obtuse or the medial rarely 1-dentate; petals white, not clawed. *G. Jaekelae.*

Leaves more or less ciliate, the lobes usually lobulate or dentate; petals more or less clawed.

Leaf-dentations narrow, acute, rarely lacking the lobes then acutish; petals usually tinted.....*G. sibbaldioides.*

Leaf-dentations broad, obtuse; petals white.*G. sessiliflorum.*

Leaves argenteous to sordid sericeous but the indument always distributed evenly.

Indument a tomentulose puberulence or close pilosity that does not extend ciliately beyond the leaf-margins.

Petals 7–12 mm. long, usually glabrous.

Leaves deeply lobed, the lobes in part 3-dentate. *G. sessiliflorum.*

Leaves shallowly lobed, the lobes entire or obscurely crenate..... *G. Pavonianum.*

Petals 14–20 mm. long when fully grown.

Leaf-divisions broad and mostly entire; petals ciliate basally..... *G. digitatum, G. nivale.*

Leaf-divisions narrow, mostly parted; petals (known) glabrous.

Peduncles to 1.5 cm. long, shorter than the leaves. *G. Weddellii.*

Peduncles 2–4 cm. long but the petioles about as long. *G. Staffordianum.*

Indument a long-sericeous pilosity, many trichomes extending loosely beyond the leaf-margins.

Leaf-divisions entire or unequally dentate.

Leaves medially to basally parted, the divisions usually 7. *G. crassipes.*

Leaves often less deeply 5-parted..... *G. Lechleri.*

Leaf-divisions regularly 3-dentate, at least medial.

Lateral as middle leaf-divisions mostly or all 3-dentate, subargenteous..... *G. Dielsianum.*

Lateral leaf-divisions often entire or 1-dentate, very argenteous..... *G. Ruizii.*

Loosely cespitose or at least caulescent but the stems sometimes obscurely developed in juvenile or retarded plants.

Peduncles 1-flowered, solitary, binate or pseudo-umbellate; plants obviously perennial except for the first species and possibly *G. chinchense.*

Petals, fully grown, 10–16 mm. long (cf. *G. scissum*).

Pubescence more or less spreading and glandular, slightly if at all retrorse, not appressed, the glands sometimes deciduous or sparse..... *G. Stuebelii.*

Pubescence more or less retrorse-appressed on stems and peduncles, eglandular, often sparse or minute.

Leaves deeply divided, even the cauline at least medially, the segments coarsely dentate or subpinnate, canescent only in *G. Raimondii*.

Peduncles ebracteate, rarely with 1 bract, or bracted at base.

Petals at most 12 mm. long; apical peduncles if short solitary or binate.

Plants green.....(*G. Stuebelii*), *G. ayacuchense*.

Plants canescent.....*G. Raimondii*.

Petals about 16 mm. long; apical peduncles short, subcymose.....*G. Weberbauerianum*.

Peduncles bibracteate about medially.....*G. laxicaule*.

Leaves shallowly lobed, the segments of the upper leaves shortly tridentate or merely crenate.

Leaf-lobes crenulate or subentire.....*G. renifolium*.

Leaf-lobes in part shortly tridentate.....*G. peruvianum*.

Petals 6–7 (8) mm. long, little exceeding the sepals.

Medial leaf-division cuneate-obovate, strongly, even petiolulately narrowed to base, this often nearly or quite to petiole.....*G. Mathewsii*, *G. piurense*, *G. ayavacense*.

Medial leaf-division rhomboid-obovate, slightly if at all narrowed to oblongish base, this rarely extending nearly to petiole-apex.

Pubescence eglandular.

Peduncles and leaves subequal.

G. Smithianum, *G. Sodiroanum*, *G. diffusum*.

Peduncles 3–5 times longer than leaves.....*G. Harmsii*.

Pubescence in part glandular.

Uppermost leaves deeply 3-parted, the segments subentire or tridentate.....*G. huantense*.

Uppermost as basal leaves about equally and broadly 5-parted, the segments lobulate or unequally dentate.

G. chinchense.

Peduncles at least in part 2-flowered; plants often annual, biennial or short-lived perennials (cf. *G. laxicaule*).

Petals nearly 12 mm. long, usually longer.

Leaves, especially the upper sericeous, canescent beneath; petals about 2 cm. long.

G. scissum, G. matucanense, G. superbum.

Leaves nearly concolor, paler and more pubescent but not canescent beneath; petals 11–14 mm. long.

G. mollendinense.

Petals rarely if ever 10 mm. long, mostly shorter.

Plants perennial (sometimes short-lived); petals usually exceeding sepals or the pubescence mostly retrorse-appressed or usually spreading and glandular above.

Pubescence especially above obviously glandular (there may be rarely eglandular states); apical peduncles soon exserted from leaves.

G. Killipianum, G. Seemanni, G. fallax, G. patagonicum.

Pubescence obscurely if at all glandular or the peduncles short, more or less concealed in the subtending leaves.

Pubescence mostly spreading; petals rather obvious; plants clearly perennial.

Bracts ovate-lanceolate.....*G. filipes.*

Bracts linear-subulate.....*G. limae.*

Pubescence mostly retrorse-appressed; petals small; plants apparently short-lived.....*G. Herrerae.*

Plants annual and introduced; pedicels glandular only in the obviously annual *G. dissectum, G. carolinianum* with petals and calyx subequal.

Sepals obviously mucronate or acuminate-mucronate; seeds reticulate; leaf-lobes subpinnate.

Peduncles several together or binate; carpels ascending-villous.....*G. carolinianum.*

Peduncles solitary; carpels spreading-hirsute.

G. dissectum.

Sepals not at all or obscurely mucronulate; seeds smooth; leaf-lobes triparted.

Stamens 10; carpels rugose.....*G. molle.*

Stamens 5; carpels smooth.....*G. pusillum.*

Geranium ayacuchense Knuth, Repert. Sp. Nov. 18: 291. 1922.

Perennial, with many ascending more or less squarrosely branched stems about 5 dm. high, the indument short, retrorse, the lower

internodes to 8 cm. long; petioles retrorse-pilose, to 2 cm. long; leaves semiorbicular, retuse at base, often 2.5 cm. wide, pubescent above with minute hyaline trichomes, pilose beneath especially on nerves, palmately 5-parted three-fourths to four-fifths the long-cuneate lobes coarsely 3-dentate marginally, the obtuse semioblong teeth minutely mucronulate; stipules pilose, narrowly lanceolate from base, long-subulate or capillary acuminate; pedicels axillary, ebracteate, 1-flowered, slender, 1.5–6 cm. long, often two from fork of branches; sepals oblong, subhirsute-pilose, 7–8 mm. long with mucro nearly 2 mm. long; petals somewhat cuneate, the few veins sparsely branched toward tip, 12 mm. long, pale rose or whitish (or white with red veins); stamens half as long as calyx, pilose; fruit 18 mm. long, the beak nearly 2 mm. thick, the valves setaceous.—Section *Rupicola* but with no close ally (Knuth). But, except for the larger flowers, it seems to me to be much like *G. diffusum* at least in Peru, otherwise like *G. laxicaule*.

Ayacucho: In grass steppes and small shrubs above Osno, Prov. Huanta, *Weberbauer 5563*, type. Pampalca, Huanta to Río Apurímac, *Killip & Smith 22214* (det. Knuth, *G. Sodiroanum*).—Huancavelica: Shrubwoods, 3,300 meters, Salcabamba, *Stork & Horton 10290* (det. Standley, *G. peruvianum*).—Apurímac: Rocky hillsides, 3,600 meters, *Stork & Horton 10777* (det. Standley, *G. Herrerae*). Huancarama, 3,900 meters, *West 3750*.—Cuzco: Damp shady places, Quenco Grande, Prov. Acomayo, *Vargas 9747?* (det. Standley, *G. Herrerae*, peduncles in part 1–2-bracted; cf. *G. laxicaule*). Hacienda Paucartica, Calca, *Vargas 155* (det. Standley, *G. diffusum?*). Hacienda Churú, 3,500 meters, *Herrera 1017; 1027a* (both distr. as *G. peruvianum*).

Geranium ayavacense Willd. ex HBK. Nov. Gen. & Sp. 5: 231. 1822; 213. *G. partitum* Willd. l.c.

Perennial from a thick much-branched root that is crowned by the basal leaves and many diffuse geniculate branching ascending or procumbent stems that are often several dm. long, their internodes as much as 1.5 dm. long; basal petioles 6–10 rarely 15 cm. long, appressed retrorse pilose-puberulent, the leaves somewhat ashy with a very fine indument, orbicular, palmately 7-parted usually to base, the lobes irregularly bi- or tri-lacinulate even medially, the lateral segments often unequal in length, all linear, rather abruptly acuminate, submucronulate; stem leaves similar, the middle and upper short-petioled but scarcely sessile; stipules triangular-lanceo-

late, acutely acuminate, pulverulent; peduncles axillary, 1-flowered, ebracteate, 3–10 cm. long, sparsely retrorsely appressed-pubescent; sepals ovate-oblong, slightly acuminate with mucro 1 mm. long, puberulent especially on nerves and long-ciliate toward base and membranous margins; petals obovate, whitish, ex neg. about 10 mm. long or one and one-half times longer than calyx, this exceeding stamens; valves puberulent as the 18 mm. long beak.—Written by error *"agavacense"* and obviously to be corrected to conform to the source of the name. F.M. Neg. 35705.

Piura: Ayavaca, *Bonpland*, type.—Huánuco: Wood clearing, Mito, *1740* (det. Knuth, *G. piurense*). Cani, *3476* (det. Knuth, *G. piurense*). Open waste land, Pillao, *Woytkowski 27*. Ecuador; Venezuela.

Geranium carolinianum L. Sp. Pl. 682. 1753; 54.

Annual, the 2 to several dm. high more or less branched sulcate stems puberulent with somewhat recurved trichomes, the lower leaves alternate, upper opposite, reniform-orbicular, subappressed puberulent, 5–7-parted nearly to the base, the lobes subpinnatifid with linear obtusish segments; lower petioles 5–10 cm. long; bracts linear-subulate; peduncles short, biflowered or the flowers nearly umbellate; sepals ovate or broader, mucro 1–1.5 mm. long or longer, mostly 5–7 mm. long, accrescent in fruit, the petals as long or slightly longer; valves smooth, nearly setose; seeds favose-punctate.—A weedy species of North America said to have been found even to Paraguay and so to be expected.

Peru: cf. note above. North America.

Geranium chinchense Knuth, Repert. Sp. Nov. 28: 4. 1930.

A several dm. tall perennial (or biennial?), the sparsely branched stems hirsute with rather long spreading trichomes; lower internodes 1–2 dm. long; basal petioles to 2.5 dm. long, hirsute, those of the upper leaves densely so, the trichomes in part glandular; stipules soon marcescent, hirsute margined, 8 mm. long, lanceolate; basal leaves depressed, 5-angled-rotund, 5-parted four-fifths or deeper, appressed pilose on nerves both sides, the main lobe cuneate-rhomboid, the upper lateral two coarsely incised pinnatifid, the lobules minutely mucronulate, those of the basal leaves semiovate, those of the upper lanceolate; peduncles 1-flowered, ebracteate, glandular hirsute, 13 mm. long, not rarely forming in the absence of developed leaves a small cyme; sepals ovate, 5–6 mm. long,

mucronulate, densely glandular hirsute, the white petals one and a half times longer; fruit about 18 mm. long, the beak 1.5 mm. thick, glandular hirsutulous, the valves sparsely pilose.—Section *Rupicola* (Knuth) but cf. *G. huantense*. My *1404* sepals 4 mm. long, petals 7 mm. long, the veins branched above only.

Huánuco: Chinche, Yanahuanca, *1263*, type. Mito, *1404* (det. Knuth).

Geranium crassipes Hook. ex Gray in U. S. Expl. Exped. Bot. 1: 309. 1854; 83. *G. muscoideum* Knuth, Bot. Jahrb. 37: 567. 1906; 87. *G. sessiliflorum* Cav. var. *lanatum* Knuth, l.c. 565, at least as to Peru.

Stemless cespitose ashy pubescent perennial, the densely matted plants as much as a dm. in diameter, the sericeous indument extending even to the sepals, only the free part of the stipules pilose, these about two-thirds adnate, 7 mm. long, acutely linear-acuminate; petioles 0.5–1.5 cm. long; leaves scarcely coriaceous, nearly orbicular, 5–6 mm. across, palmately 7-parted almost to base, the acutish oblanceolate lobes similar; peduncles solitary, 1-flowered, ebracteate, at most 5 mm. long; sepals oblong-lanceolate, acutish, coriaceous, 3-nerved, 5–6 mm. long, 2.5–3 mm. wide, the inner often longer; petals white, 13–15 mm. long, obovate, ciliate at the somewhat narrowed base, or nearly linear, glabrous as here interpreted; stamens and pistils shorter than calyx, the puberulent beak of the fruit finally one and a half times longer.—This is Knuth's description for his species; he referred Hooker's to *G. sessiliflorum*. Illustrated, Pflanzenreich, l.c. *fig. 14*. F.M. Neg. 26373 (*G. muscoideum*).

Junín: Near La Oroya among polster and rosette plants, 4,300 meters, *Weberbauer 2619* (type, *G. muscoideum*). Obrajillo, *Wilkes Exped.*, type. Rocky slope, Huarón, *1148B* (det. Knuth, *G. sessiliflorum* var. *lanatum*). Tarma to Jauja, 4,500 meters, *Killip & Smith 21968* (det. Knuth, *G. Lechleri*). Cobracancha Valley near Cerro de Pasco, 4,200 meters, *Grant 7557* (distr. as *G. Ruizii*). Cerro de Pasco, (*Mathews*).

Geranium Dielsianum Knuth, Bot. Jahrb. 37: 563. 1906; 81.

Habit of *G. sessiliflorum* but densely lanuginose with silvery sericeous indument; petioles 2–3.5 cm. long; leaves reniform-rotund, the largest 10 mm. long by 14 broad, palmately 7-parted to the middle or somewhat farther, the lobes broadly cuneate-obovate, the three middle ones tridentate, the outermost lateral with 1 tooth

at the outer edge; stipules about 13 mm. long, more than half connate, pilose marginally, the 5 mm. long free parts acutely acuminate; peduncles solitary, basal, 1-flowered, ebracteate about 8 mm. long, densely lanate; flowers medium, not topping the leaves; sepals oblong-lanceolate, acutely acuminate, to 7 mm. long, 2.5 mm. wide, lanate; petals white, 8–10 mm. long, obovate, entire, glabrous even on the claw.—Cf. *G. sessiliflorum* var. *lanatum* Knuth. *G. sericeum* Willd., 80, might be sought here but the leaves divided as in *G. acaule;* Ecuadorean, it is to be expected. Illustrated, Pflanzenreich, l.c. *fig. 14.* F.M. Neg. 26368.

Cajamarca: At Pass Coymolache above Hualgayoc on rocks at 4,000 meters, *Weberbauer 3959*, type; 272.

Geranium diffusum HBK. Nov. Gen. & Sp. 5: 230. 1822; 214.

A perennial, with many ascending or suberect slender sparsely branched retrorsely subhispid stems 1.5–2.5 dm. tall; middle petioles 2 cm. long, softly spreading pubescent, the uppermost nearly lacking; leaves appressed hispidulous, round-reniform, palmately 5–7-parted, the obcuneate lobes apically trilobulate, the middle lobe often trilaciniate, the lobules all ovate and obtusely mucronulate; stipules lance-subulate, membranous, ciliate, 3–4 mm. long; peduncles axillary, solitary, ebracteate, 1-flowered, densely spreading pilose, 2–3 cm. long; sepals elliptic-oblong, about 5 mm. long with mucro 0.5 mm. long, pilose; corolla 10–12 mm. broad, the oblanceolate clawed petals 7 mm. long.—The Peruvian material is scarcely typical; Knuth accepted and proposed many segregates perhaps with reason. F.M. Negs. 4776 (Berlin); 35706 (Paris).

Without data, *Bonpland*, type.—Cuzco: Colinas del Saxaihuamán, *Herrera 1044* (distr. as *G. filipes*). Near Cuzco, *Herrera 2341* (distr. as *G. filipes*). Calca (Vargas 155; 3222).—Apurímac: Sunny space in forest, 3,200 meters, *Goodspeed Exped. 10628* (det. Standley, *G. tablasense* Knuth?). Ecuador.

Geranium digitatum Knuth, Repert. Sp. Nov. 28: 1. 1930.

Cespitose, forming dense mats as much as 14 cm. across and rarely with a densely leafy stem 1–2 cm. long; petioles about 1 dm. long silvery sericeous as the sepals and the numerous leaves, these 2–2.5 cm. wide, 5-lobed nearly to base, the elongate-oblong minutely mucronate lobes 12 mm. long, 4 mm. wide; stipules 15 mm. long, free only 4 mm. where lanceolate, acuminate; peduncles 1-flowered, ebracteate; sepals lanceolate, 10 mm. long, the margins pale, the

stamens as long; the petals one and a half times longer, violet; fruit 18 mm. long, the beak and valves minutely sericeous.—Section *Andina;* character after Knuth; apparently referable to *G. nivale,* as an ecological race, robust, caudices long, leaflets much larger, etc.

Junín: Limestone outcrops, La Oroya, 3,400 meters, *940,* type.

Geranium dissectum L. Cent. Pl. 1: 21. 1755; 51.

Annual, often with several or many spreading or ascending usually retrorse hirsute stems 1 to 5 (or more) dm. long; petioles 3–4 times longer than the basal broadly lobed or parted leaves, the reniform-orbicular middle and upper leaves 5–7-parted nearly to the base, the segments subpinnatifid with linear divisions; peduncles solitary, 2-flowered, the upper ones often shorter than the glandular pedicels; sepals ovate, acuminate, long-mucronate, open and accrescent to 9 mm. long; petals obcordate, as long as calyx, bearded above claw, typically purple; valves smooth, spreading-hirsute, the seeds regularly and deeply favose-punctate.—Widely spread, including much of South America as Ecuador and Chile.

Peru: Will be found in waste places. Generally introduced from Europe and Eurasia.

Geranium fallax Steud. Flora 39: 439. 1856; 147. *G. tucumanum* Knuth, Pflanzenreich IV. 129: 147. 1912?

Stems branched, puberulent, rather weak; petioles pilose; leaves 3–5-parted, the lobes 3–6-lobulately incised, setulose-pilose; peduncles mostly 1- rarely 2-flowered, hirsute pilose as the calyx, this with ovate shortly acuminate sepals that are a little shorter than the red petals.—Not recognizable from description according to Knuth and scarcely the same as the Tucumán plant, which however was labeled in Herb. Berlin *G. fallax.* Ex neg. the trichomes seem to be gland-tipped; seems to be *G. patagonicum* or allied. F.M. Neg. 4780.

Puno: Near Tabina, *Lechler 1907,* type.

Geranium filipes Killip, Journ. Wash. Acad. Sci. 16: 569. 1926.

Rhizome vertical, 4–5 mm. thick, apically with 2 or 3 slender little-branched erect or ascending densely subretrorse-strigillose stems 1–1.5 dm. high, exceeding the basal leaves, these as the cauline orbicular-reniform, 1–1.5 cm. long, 1.5–2 cm. wide, 5-lobed about to middle (lobes trilobulate, rarely entire, the rounded segments mucronulate), membranous, appressed-strigillose above, pilosulous on nerves beneath; petioles 3.5–7 cm. long; stipules linear-lanceolate,

5–7 mm. long, acute, merely ciliate; peduncles solitary, very slender, 2–5 cm. long, retrorse-strigillose, 2-flowered; bracts acuminate, glabrous; pedicels pilose, 4–6 mm. long; sepals lanceolate, 4–5 mm. long, conspicuously mucronate, appressed hirsutulous, the subtrinerved slightly glandular, pilosulous; petals 5–8 mm. long, deep pink, few, unbranched, nerves pale; stamens shorter than calyx, filaments ciliolate, anthers 1 mm. long.—After Killip, who noted: evidently of section *Rupicola*, the two other Peruvian species with more numerous ebracteate white flowers, emucronate leaf-lobes; cf. also *G. magellanicum* Hook. f., 70, and *G. limae*, 74.

Contains a bitter principle used for throat infection, "thrush" (Herrera).

Cuzco: Hacienda Churú, Prov. Paucartambo, 3,500 meters, *Herrera 1044*, type. "Chile-chile," "ujutillo."

Geranium Harmsii Knuth, Bot. Jahrb. 37: 559. 1906; 213.

Tufted from an elongate horizontal branched rhizome, the branches 1 dm. long or longer, subligneous, 4–5 mm. thick, tortuous and more or less clothed with stipules and old petioles; stems usually many, to 3 dm. long, laxly ascending, pseudodichotomously squarrose-branched, many-leaved, puberulent; basal stipules lanceolate-acuminate, finally subulate, the medial 4–5 mm. long; basal petioles 4–5 cm. long, the upper gradually shorter, never obsolete; leaves puberulent, all reniform-rotund, the basal 12–15 mm. broad, usually three-fourths to four-fifths regularly palmately 5 (–7)-parted, the cuneate lobes to one-third trilobed, the lateral lobules oblong-ovate, the middle one broader, all obtusish or scarcely mucronulate; peduncles axillary, 1-flowered, ebracteate, at anthesis 3 cm. long, finally 5 cm. long; sepals 6 mm. long, gradually acuminate with mucro 1 mm. long, glabrescent within, pilose without, especially margins and toward base, the oblong-ovate retuse white petals scarcely 8 mm. long; pistils and stamens shorter than calyx; beak shortly puberulent.—F.M. Neg. 4782.

Junín: Among scattered shrubs and small grasses east of Palca, 2,800 meters, (*Weberbauer 2451*, type); 248.

Geranium Herrerae Knuth, Repert. Sp. Nov. 28: 1. 1930.

Many-stemmed annual or apparently short-lived perennial, 2 dm. or so tall, more or less sparsely appressed pilose, most densely the pedicels and calyces; basal leaves with petioles about 2 dm. long, the round blades 3–4 cm. wide drying papyraceous, 7-parted to well

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below the middle, the lobes one-third to two-fifths 3-lobulate-dentate, the anterior lobules rounded and minutely mucronulate; uppermost leaves nearly subsessile; stipules about 8 mm. long, linear-subulate, very acute; peduncles biflowered, 8–20 mm. long; bracts 4, subulate, 2 mm. long; pedicels 1 cm. long; sepals broadly ovate, abruptly acuminate, acute, 3 mm. long, 2 mm. wide, the petals twice as long, beautiful carmine, the pilose filaments as long; pistils hirsutulous, the beak minutely puberulent, the valves somewhat appressed-spreading hirsute.—Section *Chilensia* Knuth with the habit of *G. pyrenaica* and the short small-leaved upper branchlets (Knuth); but it suggests strongly *G. carolinianum* and *G. core-core* Steud., 75; type not seen.

Cuzco: Ollantaytambo, Prov. Urubamba, 3,000 meters, (*Herrera 234*, type). Near Cuzco, Est. Exp. Kaisa, *Vargas 667* (det. Standley, *G. peruvianum?*).—Arequipa: Water courses, Chachaní Mountains, *Hinkley 66* (distr. as *G. core-core?*).—Moquehua: Near Torata, 3,100 meters, *Weberbauer 7479* (det. Knuth). "Aguja-aguma," "relojito" (both Vargas), "comirachi" (Hinkley).

Geranium huantense Knuth, Repert. Sp. Nov. 28: 8. 1930. *G. choimacotense* Knuth, l.c. 9.

A perennial, with many procumbent or scandent furcately branched stems that attain a meter or more, glabrous below, somewhat sulcate and retrorse or above more or less spreading subhirsute; petioles to 8 cm. long, densely lanate-hirsute with long more or less spreading trichomes; stipules nearly subulately contracted from an ovate base, 4–7 mm. long; leaves to 5 cm. broad, for four-fifths 3–5-parted, appressed hirsutulous especially beneath on nerves, the lobes rather rhomboid, the two upper lateral deeply pinnatifid with lobules 3–6 mm. long, 2–6 mm. wide, mucronulate; uppermost leaves 3-parted, the acute lobes entire or 1-toothed; peduncles ebracteate, 1-flowered, 18 mm. long, not rarely in small cymes, densely stipitate, glandular as sepals, these ovate-lanceolate, about 5 mm. long, 2–2.5 mm. wide, membranous-margined with mucro less than 1 mm. long; petals reddish-white, cuneate, with rounded or obtuse apex, about 6 mm. long, veins little-branched; stamens and pistils glandular; fruit 15 mm. long, the valves glabrate, the beak densely glandular.—Habit of *G. laxicaule* Knuth but indument diverse (Knuth). I have included in the description *G. choimacotense* which as to type seems to me to be at most only a variant or race with smaller leaves, the lobes more evenly dentate, and the pubescence rather less glandular;

I choose the name *G. huantense* as more appropriate. Nearly *G. Knuthianum* Macbr. Candollea 6: 7. 1934 (*G. elongatum* Knuth, 209) of Ecuador, that with peduncles in part 2-flowered, fruit beak 2.5 cm. long.

Ayacucho: Choimacota Valley, Prov. Huanta, *Weberbauer 7579* (type, *G. choimacotense*); same locality, *Weberbauer 7619*, type.—Junín: Near Huancayo, *Soukup 2760*.—Huánuco: Trailing at wood edge, Tambo de Vaca, *4407* (det. Knuth, *G. choimacotense*).

Geranium Humboldtii Spreng. Syst. 3: 70. 1826; 87. *G. acaule* Willd. ex HBK. Nov. Gen. & Sp. 5: 231. 1822, not L. or Thunb. *G. potentilloides* Willd. ex Spreng. l.c. 71, not L'Hér. ex DC. Prodr. 1: 639. 1824. *G. multipartitum* Benth. Pl. Hartw. 166. 1845, at least as to Peru. *G. hypoleucum* Benth. l.c., fide Knuth. *G. multipartitum* Benth. var. *velutinum* Knuth, Bot. Jahrb. 37: 566. 1906? and var. *glabrescens* Hieron. ex Knuth, l.c.

Forming low dense mats from the shortly branching ligneous thick caudex that above may be more or less clothed with the remains of the often filiformly acuminate stipules, these broad and adnate below, 8–10 mm. long; petioles about 1 (–2) cm. long, glabrate; leaves 7–10 mm. wide, glabrous and lustrous above in type and silvery sericeous beneath, but as interpreted, variable in pubescence, orbiculate, 5–7-parted, the divisions 2–5-laciniate nearly to base with thickish linear obtusish segments; sepals ovate-lanceolate and acute or in the Peruvian forms long-acuminate or sometimes mucronulate, about 5 mm. long, puberulent or nearly glabrous; peduncles ebracteate, often only 5–10 mm. long; petals about 7 mm. long; fruit beak in type to 10 mm. long, tomentose, in vars. shorter and glabrous or nearly.—In view of the variation accepted by the monographer himself for the species of Bentham it has seemed impossible to consider the plant of Peru as more than a part of a single species. The Wilkes Expedition specimen, very meager, has leaves appressed-strigose, merely subsericeous both sides, but nearly glabrous in my collections; fide Knuth the leaves in type are not glabrous as described originally but argenteous-sericeous beneath. F.M. Neg. 4766.

Cajamarca: Above Hualgayoc, dense shrub-cactus area, 4,000 meters, (*Weberbauer 3990*, type, *G. multipartitum* var. *velutinum*).—Lima: Obrajillo, *Wilkes Exped.*—Huánuco: Wet grassy slopes, petals white or pinkish, *3296* (det. Knuth, *G. multipartitum* var. *glabrescens*). Mossy rocky uplands, flowers bright pink or white, Tambo de Vaca, *4401* (det. Knuth, *G. multipartitum* var. *glabrescens*). Ecuador.

Geranium Jaekelae Macbr. Candollea 6: 7. 1934; 87. *G. minimum* Knuth, Bot. Jahrb. 37: 567. 1906; 87, not Cav., 1787.

A small densely cespitose nearly completely glabrous perennial, the stemless individual plants only a few cm. across but with shortly branched tuberculate caudex 6–20 mm. thick that is closely clothed above with stipular and petiolar remains just below the many small leaves and flowers; stipules 4–5 mm. long, two-thirds adnate, the free point linear-subulate, very acute; petioles 5–15 mm. long, minutely appressed setulose; leaves semiorbicular or reniform-rotund, 5–7 mm. wide, deeply palmately 7-parted, the broadly obovate often nearly rotund obtusish lobes entire or rarely the medial 1–3-toothed; peduncles solitary, 1-flowered, ebracteate, 5–7.5 mm. long, glabrescent; sepals 5–6 mm. long, 2.5 mm. wide, lanceolate, scarcely acuminate, callose-mucronate, not prominently nerved; petals white, one and one-half times longer than calyx, obovate, entire, not clawed; filaments about half as long as calyx; fruit undescribed.—Commemorates in taxonomic botany with exceptional worthiness the work of Annemarie Jaekel (Mrs. A. Hirsch), principal photographer for the Field Museum series of type photos. F.M. Neg. 4789.

Junín: Near La Oroya in polster and rosette plant mats, 4,300 meters, *Weberbauer 2623*, type; 201, 223.

Geranium Killipianum Knuth, Repert. Sp. Nov. 34: 144. 1933.

Perennial, with many decumbent-ascending pseudodichotomously branched stems, these rather densely stipitate glandular-hirsute or -hirtellous as also petioles (lower 4–5 cm. long), peduncles (2–4 cm. long), pedicels (1–1.5 cm. long) and sepals; leaves opposite, appressed pubescent above setose pilose beneath, especially on nerves, deeply but usually not to base 5(–3)-parted, the lobes coarsely incised, pinnatifid, the middle one 10 mm. long, 3 mm. wide, the lateral much smaller; stem leaves short-petioled, those of the uppermost about 1 cm. long; peduncles 2-flowered, most numerous above; sepals ovate, acutely acuminate, 7–8 mm. long, nearly 3 mm. wide at base, 3-nerved, little longer than stamens, the roseate obovate petals about 8 mm. long, the veins nearly free; fruit 23 mm. long, the beak 1.75 mm. thick, glandular-hirtellous as the valves dorsally.—Section *Mexicana*. Apparently with no distinctive character from *G. Seemanni*, etc.

Lima: Río Blanco, about 3,300 meters, *Killip & Smith 21644*, type.

Geranium laxicaule Knuth, Pflanzenreich IV. 129: 209. 1912.

Many-stemmed from a nearly naked horizontal rhizome 3–7 mm. thick; stems slender, decumbent or dependent, 5–8 dm. long, little branched, sparsely retrorse-pubescent, the internodes often 1.5 dm. long; stipules lanceolate, acute, membranous, pilose; leaves all alike, the younger as the petioles silvery sericeous, the former in age sparsely appressed pubescent with hyaline trichomes, the latter spreading pilose, the basal very lax and 1.5 cm. long or longer; leaf-blades angulate-reniform, irregularly three-fourths or four-fifths palmately 5-parted, the broadly obovate lobes 3-dentate-lobulate, the lobules minutely mucronulate, the middle one often 5 mm. wide and long; peduncles filiform, 8–12 cm. long, retrorse-spreading, pilose, bibracteate, uniflowered (so far as known), the lanceolate-linear acute pilose membranous bracts 3 mm. long; pedicels pubescent and eglandular like peduncles, 2–5 cm. long; sepals ovate, 4–6 mm. long, 2 mm. wide, 3-nerved, scarious-margined, densely covered with long hyaline trichomes, mucronate with callus 0.5 mm. long; petals obovate, twice as long as calyx, reddish white; stamens as long as calyx, the styles a little shorter.—Allied by Knuth to *G. elongatum* Knuth, 209, of Ecuador, with densely glandular-hirsute pedicels and sepals. *G. holosericeum* Willd., 104, probably Colombian, seems from the negatives to be in general similar. F.M. Neg. 4786.

Lima: Southwest of Matucana behind the valley Huillacachi at a small waterfall, 3,000 meters, (*Weberbauer 187*, type).

Geranium Lechleri Knuth, Pflanzenreich IV. 129: 80. 1912. *G. sericeum* Willd. var. *microphyllum* Wedd. Chlor. And. 2: 285. 1857. *G. microphyllum* (Wedd.) Briq. Ann. Cons. et Jard. Bot. Genève 11 & 12: 183. 1908, not Hook. f., 1844.

Dense cespitose stemless perennial herb forming mats about 5 cm. across that are densely clothed with a rather long silvery lanuginose indument which extends, appressed, even to the sepals; caudex much branched; stipules 5–7 mm. long, to two-thirds adnate, pale, glabrous except ciliate margins, the free portion triqetrous-ovate, acute; petioles about 1 cm. long or one and a third times longer than the leaf blades, these coriaceous, reniform-rotund, the sinus open or suborbicular, deeply but rarely to the base palmately 5-parted, 5 mm. long, 8 mm. wide, the 3 middle lobes rather obovate, the lateral oblong, all obtusish, the middle often toothed or with a lobe, the lateral rarely; peduncles solitary, basal, uniflowered, ebracteate, barely to 1 cm. long, stout; flowers white, medium size

scarcely exceeding the leaves; sepals 5.5–6.5 mm. long, ovate-oblong, barely acute, hardly twice exceeded by the beak.—The type is from great altitudes in the cordillera of Carabaya. F.M. Neg. 4787.

Puno: Near Agapata, *Lechler 1985*. Bolivia.

Geranium limae Knuth, Pflanzenreich IV. 129: 74. 1912.

Perennial, with deeply set brown often tuber-like root; entire plant to sepals more or less canescent with spreading setulose-pilose indument little if at all glandular, appressed and sparse on the leaves above, patent on the veins beneath; stems 1-several, sulcate, prostrate or ascending-erect, about 3 dm. high, branched at middle; stipules and bracts narrow, acuminate, the former to 5, the latter to 10 mm. long; basal petioles 12–20 cm. long, about five times longer than width of leaves, these angulate-reniform, usually three-fourths 7-palmately parted, 5–6 cm. broad, 3 cm. long, the broadly cuneate lobes to one-third palmately, 2–5-lobulate (usually medially 3-lobulate), the ovate rounded lobules obscurely mucronulate; peduncles usually biflowered, slender, 3.5–6.5 cm. long, long white-pilose; pedicels 7–25 mm. long, most densely pilose beneath calyx; petals roseate or pink, about 7 mm. long, the few veins little branched, the sepals broadly ovate, 6 mm. long, 3-nerved, minutely mucronate; fruit at least 17 mm. long, the beak puberulent, the valves lightly pilose.—Typically at least a local "species." F.M. Neg. 26369.

Said to be used for toothache.

Lima: San Lorenzo, Gaudichaud, type; *Wilkes Exped.* San Gallen Island, (*Murphy 3473; 3474*). Barranco, rock crevices, *Worth 9117*. Lomas Chancay, *Raimondi; Ruiz & Pavón*. Lomas de Dona Maria, *Goodspeed Exped. 9255*. Atacongo lomas, *Goodspeed Exped. 9288*. Viso, *Goodspeed Exped. 11526*.—Ancash: Lomas de La Chay, among boulders, *Goodspeed Exped. 9207*.—Arequipa: Near Atequipa, *Worth & Morrison 15665*. "Antaccara," "chili-chili."

Geranium Mathewsii Briq. Ann. Cons. Jard. Bot. Genève 11 & 12: 188. 1908; 213.

A perennial to about 4 cm. high from a short caudex and with slender striate flexuous procumbent stems that, like petioles (lower 11–40 mm. long) and pedicels (5–15 mm. long), are finely retrorsely puberulent or glabrate; stipules short, lanceolate, scarious; basal leaves to 6 mm. broad, 3–5-parted, the obcuneate segments about 8 mm. wide, often 3-toothed to middle, the teeth narrowly oblong, subacute, ashy green both sides with appressed puberulence; cauline

leaves few, reduced, shortly petioled; bracts 10 mm. long, very acute; flowers small, solitary or binate in the axils, the sepals ovate, densely pilose below, more appressedly above, 4 mm. long including mucro 1 mm. long; petals 4 mm. long, obovate, glabrous, the stamens shorter; valves shortly appressed puberulent, 8 mm. long, crowned with the short spreading styles.—Type, Herb. Zürich. In habit simulates *G. sibbaldioides* according to Knuth but the type, merely a scrap, is obviously stemmed, and doubtfully more than a young or poorly developed *G. ayavacense* or *G. piurense*, if these are separable.

Amazonas: Chachapoyas, *Mathews*, type.

Geranium matucanense Knuth, Repert. Sp. Nov. 28: 5. 1930.

Perennial, with glabrous or sparsely pilose stout sulcate little branched stems attaining 6 dm. or so, the root a more or less vertical rhizome as much as 2 cm. thick at top; basal petioles about 15 cm. long, all especially the upper as the peduncles (1–2-flowered, 4–12 cm. long) and pedicels (4 cm. long) retrorse appressed pilose; stipules soon marcescent, 7–8 mm. long; leaves 3–5 cm. broad, nearly to base 5(–7)-parted, angulate-rotund, sparsely pubescent above with minute hyaline trichomes, densely silvery or lutescent sericeous beneath, the lobes coarsely incised pinnatifid, the lobules about 9 mm. long, 2.5 mm. wide, barely mucronulate; bracts linear-subulate, 4–5 mm. long; sepals oblong, 1 cm. long, 3 mm. wide, with linear mucro 2 mm. long, closely sericeous; petals deep blue or blue-purple, marginally pilose; stamens and sepals equal length, pilose; gynaecium sericeous.—Section *Rupicola*. Seems to go to *G. superbum* unless for the pilose petals and stamens, these not described from the latter.

Lima: Matucana, *462*, type.

Geranium molle L. Sp. Pl. 682. 1753; 57.

An annual, typically rather densely pilose with flat trichomes of unequal length; stems soon procumbent-ascending, often many and becoming several dm. long; petioles longer than the reniform leaves, these medially 7–9-lobed, the lobes deeply 3-parted with broad obtuse segments; peduncles 2-flowered; sepals oblong-ovate, acuminate, shortly acuminate and obscurely mucronulate, the ob-cordate petals sometimes twice as long, finely ciliate toward base; valves glabrous but transversely rugose, the seeds smooth.—Eurasia and widely spread even to Chile. *G. rotundifolium* is similar but petals shorter, valves puberulent, seeds reticulate.

Peru: To be expected. Eurasia.

Geranium mollendinense Knuth, Pflanzenreich IV. 129: 580. 1912. *G. multiflorum* Knuth, Bot. Jahrb. 37: 561. 1906; 146 not Gray, 1854.

Character in general that of *G. Weberbauerianum;* leaves from base to apex 2 cm. long, 5–7-parted nearly to base, the apically rounded divisions 3–5-lobulate, the lobules coarsely 3–5-lobulate, the middle one often 5 mm. long, 7 mm. broad, mucronulate, the lobes of the upper leaves much narrower, acute; lower stipules acute; peduncles mostly biflowered, 1.25–2 cm. long, with short spreading pubescence, recurving in fruit; sepals ovate or oblong-ovate, hirsute on the 3 nerves, 3 mm. wide, 6–7 mm. long not counting mucro, this about 1 mm. long; petals 11–14 mm. long, obcordate, emarginate, white; mature fruit 2 cm. long, the valves long-hirsute, the beak densely spreading puberulent. F.M. Neg. 4790.

Arequipa: Among rocks in the lomas at 400–600 meters near Mollendo, *Weberbauer 1579*, type.

Geranium nivale Knuth, Bot. Jahrb. 37: 563. 1906; 79.

Similar in habit to *G. muscoideum;* leaves 7 mm. long, 10 mm. broad, subcoriaceous, ashy sericeous with a dense indument, palmately 5-parted nearly to base, the obovate- or lanceolate-spathulate entire lobes obtusish or rounded and the middle often broader than the lateral and tridentate, the lower lateral sometimes with 1 lobule or tooth; stipules often four-fifths adnate; peduncles 5–20 mm. long; sepals 8 mm. long, 3 mm. wide; petals 14–20 mm. long, long-clawed; fruit 18 mm. long, the valves pilose.—Illustrated, Pflanzenreich l.c. *fig. 14*, page 82. F.M. Neg. 4791.

Junín: Between Tarma and La Oroya on limestone rocks at 40 meters, *Weberbauer 2533*, type. La Oroya, *Kalenborn 88*.

Geranium patagonicum Hook. f. Fl. Ant. 252. 1844–47; 74. *G. titicacaense* Knuth, Repert. Sp. Nov. 45: 60. 1938. *G. tablasense* Knuth, Meded. Rijks Herb. Leiden 27: 68. 1915, at least as to Peru.

Lax with stems 4–6 dm. long, 3 mm. thick, grayish below with rigid retrorse trichomes, toward the tips these hyaline and more or less spreading; lower petioles 6–10 cm. long, glandular; stem leaves similar to basal but shortly petioled, about 5 cm. wide, appressed pilose-puberulent both sides with hyaline trichomes especially on the nerves, 5-parted nearly to base, the divisions narrowly elongate-rhomboid and subpinnate with scarcely mucronulate acutish teeth; stipules and bracts linear, very acute, the former 8–9 mm. long, the

latter 4 mm. long; peduncles 2–4 cm. long, 2-flowered, densely glandular as pedicels (5–7 mm. long), sepals and beak of fruit 4–6.5 mm. long; sepals oblong-ovate with mucro 1 mm. long, the petals 6–8 mm. long (probably still longer), purple or roseate; beak 2 cm. long, valves pilose, seeds punctulate-rugose.—This is Knuth's description of *G. titicacaense* of which he wrote: distinct from *G. patagonicum* Hook. f. in the dense glandular indument of the upper parts (Knuth). The type was originally referred to Hooker's plant by Knuth himself, who however describes that as having the broad leaf-segments of *G. mexicanum;* maybe there is one somewhat variable species.

Moquehua: Carumas, 3,000 meters, *Weberbauer 7307* (type, *G. titicacaense*).—Arequipa: Ubinas, *Raimondi* (det. Knuth).—Cuzco: Hacienda Pfuyucalla, 3,400 meters, (*Herrera 2981*, det. Knuth). Cerro de Cusilluyoc, in thicket, 3,000 meters, *Pennell 14133* (det. Knuth, *G. tablasense*). Yucay, Prov. Urubamba, 2,840 meters, *Vargas 712* (det. Standley, *G. tablasense*). Bolivia. "Rebojillo."

Geranium Pavonianum Briq. Ann. Cons. Jard. Bot. Genève, 11 & 12: 183. 1908; 83.

In general like the pubescent form of *G. sessiliflorum* but densely tomentulose; petioles 1–1.5 cm. long; leaves 5 by 9 mm., 5-lobed scarcely to middle, the lobes entire or slightly tricrenate; peduncles about 2 cm. long; sepals 3.5 mm. long with mucro 0.5 mm. long; petals 6–7 mm. long, 3 mm. broad.—F.M. Neg. 26375.

Peru(?): Without data by Pavón in Herb. Delessert, type.

Geranium peruvianum Hieron. Bot. Jahrb. 21: 316. 1895; 160.

Stems sparsely branched, ascending, hirsute-pilose with spreading or subreflexed trichomes; lower petioles to 4 cm. long, hirsute; leaves hirsute-pilose both sides, the lower cordate-orbicular, 7-lobed with cuneate apically tridentate lobes, the terminal teeth broadly ovate, shortly acuminate, the narrower more elliptic lateral acutish; basal leaf (one known) 1 cm. long, 18 mm. wide, ultimate depth of upper sinus about 5 mm.; stem leaves smaller, 5-lobed, similar, or the lowest lateral lobes entire or with a tooth or lobule; peduncles apparently all axillary, 1-flowered, bibracteate at base, the bracts like the narrow scarious stipules, or ebracteate, 1.5–6.5 cm. long; sepals 3-nerved, oblong, 8–10 mm. long, 3 mm. wide, hirsute, obtusish, mucronate; petals obovate-cuneate, clawed, truncate, about 5-nerved, the veins flabellately branched, said to be about 16 mm. long including the 4–5 mm. long claw, 7 mm. wide below the apex;

filaments ciliate at base; fruit about 7 mm. long, the hirsute valves 4 mm. long, the glabrous beak about 3 mm. long.—The negative of the scrappy type shows much smaller flowers than described, actually only about 12 mm. long but maybe not fully grown; in this case the species may be compared with the probably distinct *G. Weberbauerianum,* or if smaller-petaled with the glandular *G. Stuebelii* or eglandular similar *G. ayacuchense* or *G. Raimondii.* Therefore until again collected it may best be restricted to type. F.M. Neg. 4792.

San Martín: Between Pacasmayo and Moyobamba, *Stuebel 51d,* type.

Geranium piurense Knuth, Repert. Sp. Nov. 18: 290. 1922.

Much like *G. ayavacense;* stems about 2 dm. long; internodes 2–3(8) cm. long; lower petioles to 5 cm. long, all nearly filiform; leaves 2–3 cm. wide, 5–7-parted to base; stipules long-acuminate from base to filiform tip; peduncles 1.5–3(6) cm. long; sepals 5.5–7 mm. long; petals spathulate, two times longer than calyx, early reddish white, finally white with purple red veins; fruit 15 mm. long, the beak ashy puberulent, the valves glabrate with a few dorsal setae.—Peraffine *G. ayavacense* (Knuth), and doubtfully ex char. distinct, especially as from same region.

Piura: Above Ayavaca, grass steppes and small shrubs, *Weberbauer 6374,* type.

Geranium pusillum Burm. f. Spec. Geran. 27. 1759; 48.

Puberulent annual, the trichomes all about the same length; stems many, ascending or procumbent, sometimes elongate; leaves reniform, more than medially 7–9-lobed, the lobes scarcely a third 3-parted, with ovate obtuse teeth; basal petioles elongate; peduncles biflowered; sepals oblong-ovate, acuminate but little mucronulate; petals narrowly obcordate, barely or not longer than calyx, purple, finely ciliate at base; valves and seeds smooth.—Another annual that is widely spreading over the world and so probably to Peru.

Peru: See above. Eurasia.

Geranium Raimondii Knuth, Repert. Sp. Nov. 28: 9. 1930. *G. canescens* Wedd. Chlor. And. 2: 286. 1857; 215, not L'Hér., 1787.

Cespitose, nearly all parts ashy tomentose, the shortly branched caudices clothed with the remains of the thick petioles; flowering stems unequal, erect, sparsely branched; leaves at least 15 mm. wide, mostly basal, long-petioled, densely tomentose both sides, rotund,

deeply 7-lobed, the imbricate obovate-cuneate lobes 3-lobulate, the lobules broadly ovate, obtuse; free part of stipules linear-subulate, puberulent or glabrate; peduncles long exceeding petioles, 1-flowered, ebracteate; flowers rather large (ex neg. 10–12 mm. long), white, the much shorter sepals 8 mm. long, lanceolate, slenderly mucronate; beak about 8 mm. long, pubescent.—To judge by the photograph the pubescence is appressed strigose rather than tomentose; the type is a scrap. F.M. Neg. 4773.

San Martín(?): Between Cajamarca and Chachapoyas, 3,600 meters, *Raimondi*, type.

Geranium renifolium Hieron. Bot. Jahrb. 21: 315. 1895; 158.

With the habit of the related *G. Stuebelii* but much less pubescent and not at all glandular; basal petioles 2.5 cm. long, appressed sericeous-pilose, the 7-lobed reniform leaves above sparsely beneath lightly hirsute or glabrate, the truncate-rounded lobes usually entire; stem leaves similar, 3–7-lobed, smaller; peduncles 2.5 cm. long, reflexed sericeous; sepals 6.5 mm. long; stamens unequal, the longer 6 mm. long.—Illustrated, Pflanzenreich l.c. *fig. 21*.

San Martín: Above Tambo Mayo between Pacasmayo and Moyobamba, *Stuebel 43*, type.

Geranium Ruizii Hieron. Bot. Jahrb. 20: Beibl. 49: 31. 1895; 81.

Habit of *G. Lechleri;* pubescence shorter, appressed sericeous; petioles to 15 mm. long; leaves 7-parted to about the middle, to 5 mm. long, 6 or 7 mm. wide, the lobes entire or often with a tooth; sepals about 6 mm. long, 2 mm. broad, mucronulate, glabrous above; petals cuneate, long-clawed, obtuse, 10–11 mm. long, 4 mm. wide, 5-nerved; filaments and pistils about 5 mm. long; petal claw ciliate at base in my collection; fruit about 12 mm. long, hirsutulous.—Knuth suggests perhaps not specifically distinct. Used as an astringent for the gums.

Junín: Morococha, (*Raimondi*, det. Knuth).—Huancavelica: (*Raimondi*, fide Knuth).—Lima: Grassy upland slope, Río Blanco, *7184* (det. Knuth).

Geranium scissum Knuth, Repert. Sp. Nov. 28: 4. 1930.

Perennial, with many ascending-suberect stems branched only above 5–10 cm. where repeatedly forked attaining about 3 dm.; stems, petioles (the lower often 4 cm. long, the upper leaves nearly

subsessile) and peduncles more or less hirsute; leaves angularly rotund, about 3 cm. wide, appressed hirsute above, the nerves there prominent, three-fourths or in the upper leaves four-fifths 5-parted, the lobes cuneate-narrowed below the middle, remotely pinnate-incised with oblong minutely mucronulate lobules; stipules linear above, very acute, 8 mm. long; peduncles 1-flowered, ebracteate, 2 cm. long, very hirsute beneath the calyx, this with ovate-oblong glaucous green sepals 1 cm. long, 4 mm. wide, the petals 2 cm. long, broadly obovate from a narrowed base, apparently pale; filaments somewhat hirsute below; the gynaecium densely sericeo-hirsute basally.—Probably ex char. should be included in *G. superbum;* peduncles always 1-flowered?

Cuzco: Hacienda Churú, Paucartambo, (*Herrera 1916*, type).

Geranium Seemanni Peyr. Linnaea 30: 66. 1859; 197. *G. mexicanum* HBK. var. *minoriflorum* (Briq.) Knuth & var. *macranthum* (Briq.) Knuth, Pflanzenreich IV. 129: 197. 1912 fide Moore, Contr. Gray Herb. 146: 84. 1943.

Perennial, the root sometimes woody, the stems at first erect elongating to as much as 10 dm., branching-ascending in age, glabrate to densely long-pilose-hirsute with flat trichomes, the long basal petioles, these to 2 dm. long, and the ample leaves, especially on nerves beneath, similarly pubescent or the indument above appressed; leaf-divisions 5 nearly equal and extending one-half to two-thirds to base, cuneate-obovate and twice cleft or dentate or shallowly so above, the middle division with short oblong obtuse segments; stem leaves similar but puberulent and long-pubescent, 2–6 cm. wide, 3-lobed, the segments dentate or cleft above the middle, the middle one broadly rhombic the latter with a basal lobule; peduncles 1.5–3 or 4 cm. long, pubescent like the leaves and usually somewhat glandular, 2-flowered, solitary from the upper axils or cymose at the branchlet tips, the pedicels 3–10 mm., pilose or glandular, erect in fruit; sepals 4–5 mm. long, awned; petals 6–8 or sometimes nearly 10 mm. long, 2–3 mm. wide, usually tinted, rarely nearly white, pilose or glabrate at base the veins nearly free except near the tip; fruit 17–22 mm. long, style beak 1.5–2 mm. long, column hispidulous and usually glandular, the carpels long-hirsute, the seeds reticulate, usually shallowly.—Weberbauer noted stems as long as 3 meters. After Moore, who recognizes the closely allied *G. subulato-stipulatum* Knuth, 199, *G. guatemalense* Knuth, 200, and other segregates. However I can only cite the following collections here since deter-

mined by Knuth as *G. mexicanum* var. *minoriflorum*. It is amazing to me that monograph students so often, as here, treat a widely distributed species-complex as constituting an areal problem.

Cuzco: Ollántaytambo, *Cook & Gilbert 717* (det. Knuth).—Puno: Sandía, (*Weberbauer 640*, det. Knuth).—Huánuco: Waste land, Pillao, *Woytkowski 115*, Mexico. "Chepu-chepu" (Cook & Gilbert).

Geranium sessiliflorum Cav. Diss. 4: 198. *pl. 77*. 1787; 83. *G. caespitosum* Walp. Nov. Act. Acad. Leop.-Carol. 19: Suppl. 1: 315. 1843, fide Knuth. *G. razuhillcaense* Knuth, Repert. Sp. Nov. 28: 2. 1930?

Cespitose and branched caudices crowned by the many leaves, crowded stipules (these a cm. or two long), solitary and rather showy white flowers on retrorsely pilose often silvery sericeous, sometimes lanate peduncles a half to 2 cm. long; petioles 1–8 cm. long, typically somewhat pilose; leaves nearly glabrous except for the nerves and cilia or densely appressed puberulent or sericeous both sides (rarely very shortly), often irregularly reniform, deeply 5–7-parted the medial of the usually tridentate lobes rounded or a little elongate and subpinnatifid; sepals oblong, acute, hirsute, 4–5 mm. long, the oblong petals usually glabrous, one and a half times longer; fruit (8) 15(–17) mm. long, valves pilose, beak puberulent.—A characteristic polster plant of the high punas and grass steppes between 3,400 and 3,600 meters. *G. sericeum* Willd. of Ecuador, similar, has 5–7-parted leaves, the lobes medially or basally 2–5-laciniate, pubescence rather loose; *G. ecuadoriense* Hieron., 86, leaves of *G. sericeum* but indument appressed. The indument of Knuth's species of 1930, l.c., according to him "probably a variety but with entirely different habit and indument" is short, nearly velvety; it can be scarcely more than a variant, in which case it may be given a simpler name, for instance var. **albatum** Macbr., var. nov. Illustrated, Pflanzenreich l.c. *fig. 15*, page 84 after Weberbauer, page 202.

Cajamarca: Above Ocros, Weberbauer 224.—Lima: Baños, Alpamarca, (*Maclean, Pickering*). Chicla, (*Weberbauer 255*, in part). Hacienda Arapa near Yauli, (*Weberbauer 363*); 221. Bunch grass slopes, Río Blanco, *808; 2974; 3006* (all det. Knuth). Viso, *608* (det. Knuth).—Ancash: Pass Chonta, (*Weberbauer 2775*).—Junín: Tarma to Oroya, (*Weberbauer 2549*). Huarón, *1148A* (glabrate, det. Knuth). Above Tarma, 4,500 meters, *Killip & Smith 21971* (det. Knuth). La Oroya, *Kalenborn 80*. East of Huancayo, 3,400 meters, *Stork & Horton 10217* (det. Standley). In puna grass, 4,500 meters,

Prov. Huancayo, *Stork 10939* (det. Standley, *G. cucullatum*); also *Soukup 1863* (distr. as *G. Ruizii*).—Huancavelica: East of Surcubamba, 3,100 meters, *Stork & Horton 10383* (det. Standley).—Ayacucho: Mount Razuhuillca, small flat cushions in puna, 4,400 meters, *Weberbauer 7495* (type, *G. razuhillcaense*).—Cuzco: Prov. Cercado, (*Gay*). Saxaihuamán, *Herrera 2383*. Pucará, Puno to Cuzco, Prov. Paruro, *Vargas 846*. Prov. Quispicanchis, *Vargas 926* (det. Standley, *G. filipes*); (*Weberbauer 410*); 185, 203.—Puno: Suchez to Poto, 4,600 meters, (*Weberbauer 1003a*); 219. Araranca, 4,100 meters, *Pennell 13439* (det. Johnston).—Moquehua: Volcano Tacsani, *Weberbauer 7326*.—Tacna: (*Meyen*, det. Knuth). To Patagonia; also in Tasmania and New Zealand.

Geranium sibbaldioides Benth. Pl. Hartw. 166. 1845; 88. *G. cucullatum* HBK. Nov. Gen. & Sp. 5: 231. 1822, not L. *G. ciliatum* Willd. ex Spreng. Syst. 3: 71. 1826, not Cav. and others.

Closely to rather laxly cespitose from a long-produced rhizome, the caudices to 7 mm. thick supporting mats 5–7 cm. in diameter; petioles puberulent, 2–3 cm. long, with reflexed trichomes; leaves many, basal, typically glabrous except the definitely ciliate margins, round-reniform, 9–15 mm. broad, palmately 5-parted to base, the lobes 3-parted about one-third, these segments oblong or the medial broader, all acutely mucronate, the outer two lobes often entire, acute, oblong-lanceolate; stipules to 8 mm. long, the free parts glabrous, membranous, acuminate-aristate; peduncles solitary, 1-flowered, often ebracteate, nearly filiform, little longer (not at all, my spec.) than the leaves, more or less densely reflexed hirsutulous; sepals oblong-lanceolate, mucronate, glabrous, about 5 mm. long; petals obovate, unguiculate, violet-red (apparently sometimes white), with 3 or 5 more deeply colored nerves (in my *2191*, 7 mm. long); beak of fruit finally 1 cm. long or, fide Knuth, barely one and a half times longer than calyx, pulverulent.—After Knuth; I have not seen Bentham's plant. Var. *elongatum* (Wedd.) Macbr. Candollea 6: 7. 1934, *G. cucullatum* HBK., var. *elongatum* Wedd. Chlor. And. 2: 285. 1857, has strongly elongate prostrate branches the leaves pubescent both sides, smaller and known as yet from Colombia; *Weberbauer 6083* with subentire leaf lobes is a variant of it or distinct. But it agrees better otherwise with negative of HBK. type than any other Peruvian specimen seen. Illustrated, Pflanzenreich l.c. *fig. 14e*. F.M. Neg. 35704 (*G. cucullatum*).

Piura: Huancabamba, 3,000 meters, *Weberbauer 6083* (var.).—Amazonas: Chachapoyas to Moyobamba, (*Raimondi*, det. Knuth).—

Huánuco: Northeast of Huánuco, grassy hillside, 3,500 meters, *2191*, det. Knuth.—Junín: West of Huacapistana in rather swampy places, 3,500 meters, (*Weberbauer 2251*).—Cuzco: Province del Cercado, (*Gay*, fide Weddell).

Geranium Smithianum Knuth, Repert. Sp. Nov. 34: 146. 1933.

Diffuse, the ascending appressed pubescent stems 3–6.5 dm. long, the middle internodes 5–10 cm. long; lower petioles 7 cm. long the upper gradually shorter, all appressed retrorse pubescent; leaves above sparsely and very shortly puberulent, more densely so beneath and marginally, reniform-orbicular, 2.5 cm. wide, usually 5-parted to base, the lobes broadly cuneate and variously incised, the medial coarsely pinnate with about 5 oblong segments 5 mm. long, 2 mm. wide, the outer with 3–4 segments; stipules narrowly lanceolate, acute, 4–6 mm. long; peduncles ebracteate, 1-flowered, 1.5 cm. long, ashy subsericeous with retrorse appressed trichomes; sepals oblong-ovate, acutish, (4.5) 5.5 mm. long, scarcely nerved, marginally and basally long white hirsute, slightly exceeding stamens and pistils; petals obovate, 7–8 mm. long, with few nearly unbranched veins, rose or whitish; beak about 13 mm. long, 1.5 mm. thick, puberulent, the valves pilose.—Section *Diffusa;* affine *G. Sodiroani* (Knuth); and seems also to resemble *G. ayacuchense*, but flowers smaller.

Lima: Río Blanco, 3,300 meters, *Killip & Smith 21769*, type.—Ayacucho: Pampola, 3,000 meters, (*Killip & Smith 22213; 23248*, both det. Knuth).

Geranium Sodiroanum Knuth, Bot. Jahrb. 37: 557. 1906; 210. *G. diffusum* HBK. var. *subsericeum* Hieron. Bot. Jahrb. 20: Beibl. 49: 32. 1895.

Character in general that of *G. diffusum* and allies but the petioles mostly about the same length, 2–5 (8) cm. long and the peduncles distinctly longer; leaves more or less pubescent only beneath, 15–32 mm. wide; stipules nearly hirsute, 4–6 mm. long; sepals 4.5–5.5 mm. long, almost as long as the white petals; stamens half as long as calyx, the fruit two and a half times longer, the valves pilose, the beak puberulent.—Seems probably only a form or variety along with other segregates. Illustrated, Knuth, l.c. page 211.

Lima: Chicla, stony places among short plants, *Weberbauer 255;* 169. Ecuador.

Geranium Staffordianum Knuth, Repert. Sp. Nov. 40: 216. 1936.

Cespitose from a long simple vertical root that supports a mat as much as 8 cm. wide, silvery sericeous with closely appressed trichomes even to the sepals except for their membranous margins; petioles 3.5–5 cm. long; leaves orbicular, 1.5–1.75 cm. wide, to two-thirds 5–7-parted, the lobes mostly deeply 3-lobulate with ovate or oblong obtusish lobules 3 mm. long, 2 mm. wide; peduncles solitary, ebracteate, 2–4 cm. long; sepals long-oblong, 8 mm. long, equaled by the stamens, nearly 3 mm. wide with mucro 1 mm. long; petals to 18 mm. long, somewhat retuse; fruit twice as long as sepals, the beak 2 mm. thick.—Distinctive in section *Andina* in the long peduncles and the large flowers (Knuth); the description reads much like that of *G. Weddellii* in a more luxuriant state.

Cuzco: At 4,000 meters, (*Stafford*, type, in herb. Kew).

Geranium Stuebelii Hieron. Bot. Jahrb. 21: 316. 1895; 159.

Diffuse, procumbent, the flowering branches ascending, the hirsute pubescence dense and the trichomes in part gland tipped often deciduous or sparse except on the sepals; petioles 3–10 mm. long; leaves reniform, about 13 mm. by 2 cm., 5-lobed to the middle or deeper, the terminal lobe a trifle larger, tridentate or rarely entire, the lateral lobes entire or the upper of these tridentate, the lowest with one tooth on the lower edge; stipules scarious, ciliate, hirsutulous both sides, narrowly ovate, acuminate; peduncles 3.5–4.5 cm. long, after anthesis recurved, the flowers nodding even in bud; sepals oblong, obtusish, mucronate (as leaf-lobes), 9 mm. long, about a third as wide, 3-nerved, green except the narrow margins, the outer densely the inner sparsely hirsute; petals obovate-cuneate, clawed, obtusely emarginate, 5-nerved, about 12 mm. long, half as wide; stamens subequal, dilated at the ciliate base, 5 mm. long; pistils 6 mm. long; valves hirsute.—Flowers white, turning rose. *G. chilloense* Willd., 146, of Ecuador would be sought here; it has larger leaves with the divisions in part subpinnate. Illustrated, Pflanzenreich l.c. *fig. 22.*

San Martín: Above Tambo Mayo between Pacasmayo and Moyobamba, *Stuebel 43a;* type.—Amazonas: Above Balsas, (*Raimondi 1793*, det. Knuth).—Cajamarca: Near Chota, 2,500 meters, prostrate, *Stork & Horton 10040* (det. Standley, *G. bolivianum*). Near Conchán, Prov. Chota, 2,500 meters, *Stork & Horton 10062* (obscurely glandular, det. Standley, *G. chinchense*).—Lima: Above

Obrajillo, 3,100 meters, rocky canyon, *Pennell 14417* (det. Knuth, *G. choimacotense*). Huaros, rock slide, diffuse, *Pennell 14718* (det. Johnston, *G. bolivianum*).

Geranium superbum Knuth, Bot. Jahrb. 37: 561. 1906; 140.

Stems 1–4 from a subligneous stout rhizome, simple below but 3–10 cm. above the base pseudo-dichotomously branched, ascending, 2–5 dm. high, retrorsely appressed pubescent to tip; basal leaves early many, the retrorsely pilose petioles 5–10 cm. long; leaves appressed pubescent above, sericeous beneath, reniform-rotund, the lobes coarsely palmate-pinnatifid, the segments linear-oblong, acutish, reddish-brown callused; stem leaves similar but gradually shorter petioled; stipules subulate, 6–7 mm. long; peduncles biflowered (rarely 1-flowered), bracteate, 6–10 cm. long, sparsely retrorse-pilose; bracts linear-subulate, very acute, 5 mm. long; pedicels 1–3 mm. long; sepals oblong or ovate-oblong, rather densely ashy pilose, 10 mm. long with reddish mucro 1.5 mm. long; corolla 3 cm. broad the broadly obovate petals 16–21 mm. long, scarcely emarginate; stamens shorter than calyx; valves long appressed pilose, the beak spreading puberulent.—*G. rupicolum* Wedd., 148, of Bolivia has leaves more sparsely pubescent above, peduncles 1-flowered, ebracteate. F.M. Neg. 4798.

Lima: Between Puente de Arichi and Chicla, grassy brook shore, 3,500 meters, *Weberbauer 259*, type; 169. Río Blanco, *Killip & Smith 21758*.

Geranium Weberbauerianum Knuth, Bot. Jahrb. 37: 556. 1906; 145.

Stems many, 2 dm. high or higher, a little taller than the basal leaves, pseudo-dichotomously squarrose-branched, softly puberulent as petioles (the basal 7–17 cm. long), former emarcidate ones densely crowning the thick vertical rhizome; leaves appressed puberulent and beneath on the nerves densely long ashy-pilose, 4 cm. broad and long, 7-angulate-orbicular, deeply palmately 7-parted, the more or less broadly rhomboid lobes unequal, the larger middle one 25 cm. long, 17 cm. wide, all coarsely palmately pinnatifid with obtuse or rounded segments, the middle often 3–4 mm. long and broad or larger; stem leaves similar but shorter petioles, the uppermost nearly sessile; stipules linear-acuminate, puberulent; peduncles 1-flowered, ebracteate, either solitary from the axils of branches or pseudo-umbellately crowded toward the branch tips, 2–5 cm. long, ashy pilose; sepals 8–9 mm. long, lanceolate or nearly linear-lanceolate, acutely acumi-

nate, the membranous margins and midnerve long setose-pilose; corolla 15 mm. broad, whitish, with deep colored nerves, the lanceolate-obcuneate petals barely emarginate, 16–18 mm. long; fruit 14 mm. long, the beak minutely puberulent; seeds nearly glabrous dorsally.—Easily recognized by the globose habit, the stems below strictly pseudo-dichotomously branched, the flowers above pseudo-umbellate while the lower are solitary, the leaf-segments rounded apically (Knuth). Cf. *G. ayacuchense.* F.M. Neg. 4801.

Cuzco: At Pucana, rocky canyon in limestone, 3,700 meters, *Weberbauer 450*, type; 186. Yucay, 3,000 meters, *Soukup* (distr. as *G. peruvianum*).

Geranium Weddellii Briquet, Ann. Cons. Jard. Bot. Genève 11 & 12: 183. 1908; 80.

Compactly cespitose, the stout somewhat branching caudex a cm. in diameter or larger, the vegetative portion of the plants rarely more than 2 or 3 cm. above the surface with the large flowers barely equaling or shorter than the closely sericeous 5-parted leaves, these deeply and narrowly trilobulate with obtuse segments; petioles slender, 1–1.5 cm. long; stipules 6–9 mm. long, long-adnate, finally glabrous; peduncles many, solitary, ebracteate, 1–1.5 cm. long; sepals oblongish, minutely mucronulate, often reddish, lightly puberulent, 7 mm. long, the stamens about as long; petals finally about 15 mm. long, glabrous in *Soukup* spec.; fruit beak nearly 1 cm. long, appressed sericeous-pilose.—F.M. Neg. 26382.

Puno: Macusani, 4,336 meters, *Soukup 537* (distr. as *G. Lechleri?*). Bolivia.

2. ERODIUM L'Hér.

In general like *Geranium* but the leaves usually pinnately lobed or dissected and more or less dentate, rarely merely lobed or even subentire. Fertile stamens 5, the alternate sterile and scale-like. Styles bearded inside. Pedicels usually recurved sharply in fruit or after anthesis.

All the species in Peru are immigrants from the Mediterranean region.

Leaves cordate-ovate, more or less lobed.

Leaves lightly if at all lobed, eglandular.....*E. malacoides.*

Leaves more or less trilobed, very glandular.....*E. geoides.*

Leaves pinnate or bipinnate.

Leaflets serrate and sparsely incised; stipules obtuse.
E. moschatum.
Leaflets incisely pinnatifid; stipules acute.....*E. cicutarium.*

Erodium cicutarium (L.) L'Hér. ex Ait. Hort. Kew. 2: 414. 1789; 274. *Geranium cicutarium* L. Sp. Pl. 680. 1753.

Annual or biennial, the more or less hirsute often reddish leafy stems procumbent-ascending and finally several dm. long; leaves at first in a close rosette, oblong-lanceolate, finely bipinnatisect, hirsute-pilose, the alternate or subopposite oblique-ovate pinnae sessile or subsessile, the uppermost confluent; peduncles to 12 cm. long, 5–10-flowered, the medially connate involucral bracts to 2 mm. long; pedicels 8–15 mm. long, early glandular; sepals ovate, nerved, tipped with 1 or 2 setae, finally 6 or 7 mm. long, the often unequal rose-purple bimaculate ciliate clawed petals little to twice as long or longer; filaments little dilated at base, not toothed; beak of fruit 2–4 cm. long.—Variable vegetatively, the many named varieties and forms not clearly of taxonomic interest. Adapted to light or barren soils and often important as a forage plant; known in English as Filaree, Alfilaria, Pin Clover or Storksbill, this last term applied to other species also. There are many illustrations. Most of the native names are after Herrera.

Lima: Obrajillo & Baños, (*Wilkes Exped.*). Lima, *Weberbauer 120.*—Amazonas: Lamud, *Raimondi.*—Junín: Río Blanco, *G. S. Meyers* (det. Ferris). La Oroya, *Kalenborn 9.*—Arequipa: Atiquipa, *Raimondi.* Nevado de Chachaní, 3,500 meters, *Pennell 13269* (det. Johnston).—Apurímac: Ampuy, *Goodspeed Exped. 10630.*—Cuzco: Calca, *Vargas 678.* Prov. Cercado, 3,400 meters, *Herrera 11.*—Puno: Salcedo, *Soukup.* Sta. Lucia, *Sharpe 64.* Chuquibambilla, 3,900 meters, *Pennell 13401* (det. Johnston). Nearly cosmopolitan. "Alfilerillo," "montillapaño," "tupu-tupu," "auja-auja," "yauri-yauri," "trinchi-trinchi," "rchjillo," "agujo" (last two fide Vargas).

Erodium geoides St. Hil. Fl. Bras. 1: 99. *pl. 19.* 1825; 248.

Much like *E. malacoides* but much more glandular and densely pilose-hirsute even from the base of the many branching stems, these procumbent, 1–3 dm. long, with numerous more or less trisected and incised-dentate leaves; bracts brown-membranous, glandular-villous; sepals 5–6 mm. long, exceeded by the small lilac petals; beak about 3 cm. long.—It seems doubtful if the following collection could have been more than a glandular state of the ruderal *E. malacoides* since

the species of St. Hilaire is native to a region rarely represented in Peru.

Arequipa: Cachendo and Pasco, (*Guenther & Buchtien 263; 263a*, both det. Bruns). Southern South America.

Erodium malacoides (L.) Willd. Sp. Pl. 3: 639. 1800; 245. *Geranium malacoides* L. Sp. Pl. 680. 1753.

Softly pilose annual or biennial sometimes 3 or 4 dm. high, the leafy more or less branched stems ascending; basal leaves many, long-petioled, cordate-ovate, often 4 cm. long, 2.5 cm. wide, undivided or sublobed, crenate-dentate; upper leaves gradually reduced, the uppermost sessile; stipules acute, often 6 mm. long; peduncles to 8 cm. long, 2–8-flowered, more or less glandular as the filiform pedicels, these 7–17 mm. long; bracts many, pale, glabrate or ciliate, ovate, obtuse, 2–2.5 mm. long, lightly connate at base; sepals oblong-ovate, glandular, 5 mm. long, 5-nerved with mucro 1 mm. long, the concolor (not spotted) petals about as long; fruit-beak 2–3 cm. long, glabrate.—Willdenow used the name in Phyt. 10. 1794. *E. laciniatum* (Cav.) Willd. 241, allied and to be expected, may be known by the retrorse-hispid stems, the more or less 3-lobed lower leaves, the uppermost more or less pinnatifid, the bracts only 2, ovate-suborbicular, the fruit-beak often 5 cm. long or even longer. Often illustrated.

Lima: At Lima, *Ruiz & Pavón*. Obrajillo, (*Wilkes Exped.*). Amancaes Hills, *Weberbauer 1627*. Río Chillón, *Pennell 14483*. Puente de Verrugas, *Seler 226*. Matucana, *94; 124; Weberbauer 63*.—Loreto: *Raimondi*.—Cuzco: Near Cuzco, *Herrera 282*. Southern Europe.

Erodium moschatum (L.) L'Hér. ex Ait. Hort. Kew. 2: 414. 1789; 281. *Geranium moschatum* L. Sp. Pl. 680. 1753.

Rather similar to the related *E. cicutarium* but the stems when developed (the plant is early a close rosette of leaves) glandular and typically pale, the stipules conspicuous, scarious, the leaflets broadly ovate, serrate or lobed, petiolulate, the bracts free, to 4 mm. long, sepals without bristles or merely 1–2-short-setose, filaments winged at base and with 2 upward pointing teeth, petals glabrous, equal, not spotted, at least twice as long as sepals; stipules large, obtuse, the stems becoming stout or fleshy.—As suggested by the name the original plant presumably was musk-scented but apparently the weedy races have little if any odor. It has been observed that *Mimulus moschatus* is a similar case. There are many illustrations

as in Pammel, Man. Poison. Pl. *fig. 320*. *E. Botrys* (Cav.) Bertol. has oblong-ovate leaves the basal ordinarily pinnately cleft into broad crenate lobes, is scarcely white-pubescent, beak of fruit often 7 cm. long or longer.

Lima: Along railroad to La Oroya, *Weberbauer 97*. Common at Matucana, *204*.—Junín: Near Huancayo, *Luis A. Chavez 181*.—Arequipa: Atiquipa, *Raimondi*. Widely dispersed from the Mediterranean region.

3. RHYNCHOTHECA R. & P.

Rhynchothelia Pers. Syn. Pl. 2: 92. 1806; *Aulacostigma* Turcz. Bull. Soc. Nat. Mosc. 20. 1: 149. 1847.

Shrubs with axillary pedicelled flowers at the tips of the many branches, opposite entire or lobed leaves. Sepals 5. Petals and glands none (or early caducous?). Stamens 10, free, all with large oblong anthers. Ovary 5-lobed, maturing as 5 caudate one-celled carpels that remain joined at base and apex.

Rhynchotheca spinosa R. & P. Syst. Veg. 142. 1798; 549. *R. integrifolia* HBK. Nov. Gen. & Sp. 5: 232. *pl. 464*. 1822; *R. diversifolia* HBK. l.c. 233. *pl. 465*. *Aulacostigma inerme* Turcz. l.c.

About 1 (–2.5) meter high, the slender tortuous flowering branches 4–5 cm. long, early quadrate and pubescent, later glabrate, leafless and spinescent; leaves many, oblong-ovate, entire or palmately 3–5-lobed, more or less sericeous beneath becoming glabrate, 10–15 mm. long, 3.5–6 mm. wide; sepals obovate, obtuse, mucronulate, 7–9 mm. long, twice as long as the caducous petals, or, apparently, these usually wanting; fruit 14–17 mm. long, silvery sericeous.—Knuth recorded three variants: var. *integrifolia* (HBK.) Knuth, var. *diversifolia* (HBK.) Knuth, var. *lobata* Knuth, l.c. 550, the last with the most deeply 3–5-lobed leaves, the largest (17 mm.) carpel beaks; the other two forms are Ecuadorian. Flowers yellow and lavender (Seibert), in my specimen sepals reddish, anthers greenish-yellow. Illustrated, Knuth, l.c. pages 550, 551.

Lima: Callao, *Ruiz*, type. Dense canyon shrub, Chasqui, *3302* (det. Johnston).—Piura: Prov. Huancabamba, 3,200 meters, *Weberbauer 6321*.—Junín: Fundacion, Cerro de Pasco to Huánuco, 3,100 meters, *Seibert 2304*.—Cuzco: To Sta. Ana, 3,200 meters, among other shrubs, *Weberbauer 4969* (var. *lobata*); 244.—Puno: Sandía to Cuyocuyo, 2,300 meters, *Weberbauer 873a* (var. *lobata*); 237. Ecuador.

4. BALBISIA Cav.

Suffrutescent, more or less branched and pubescent, the alternate or opposite leaves mostly 3-parted, rarely entire. Flowers solitary, terminal, yellow on rather long peduncles, regular, with 5 imbricate sepals, 5 hypogynous contorted petals. Stamens 10, hypogynous, free, anthers large. Ovary 5-angled, 5-celled, erostrate; stigmas 5, ligulate, sessile, ovules many in 2 series in each cell. Capsule apically dehiscent loculicidally by 5 valves that persist, the many seeds with thin fleshy endosperm.

Filaments and ovary subequal; sepals about 7–9 mm. long; central Peru ..... *B. verticillata.*

Filaments longer than ovary; sepals about 10 mm. long.

Leaflets 1–1.5 mm. wide; involucral leaves setaceous.

Leaflets 5–10 mm. long, usually greenish ..... *B. Meyeniana.*

Leaflets 3–6 mm. long, silvery ..... *B. Weberbaueri.*

Leaflets 2–3 mm. wide; involucral leaves linear-lanceolate. *B. pedunculariis.*

Balbisia Meyeniana Klotzsch, Linnaea 10: 432. 1836; 555. *Ledocarpon Meyenianum* (Klotzsch) Steud. Nomencl. ed. 2. 2: 20. 1841.

Somewhat to much branched shrub to about one meter, the ash-colored branches glabrous, the flowering branchlets densely tomentose, 1 mm. thick; leaves numerous, opposite, 1–1.5 cm. distant, sessile, mostly 2–3-parted to base, the divisions ashy subhirsute or sericeous, linear, entire, obtusish, 5–8 mm. long, 1 mm. wide, gradually narrowed to base; flowers terminal on slender puberulent pedicels 1.75–3 cm. long; involucral leaves 8–10 mm. long, the subulate lobules more or less spreading hirsute; sepals to 14 mm. long, 3 mm. wide, lanceolate, gradually and acutely acuminate, ashy puberulent; corolla orange, 4–4.5 cm. broad, the petals twice as long as the sepals, 2–2.5 cm. long, 11–13 mm. wide, rounded apically, entire; filaments twice as long as the white hirsute ovary, the densely villous capsule half as long as calyx.—After Knuth. It may be recorded that my European notes read: apparently the same as *B. verticillata.* Illustrated, Knuth, l.c. *fig. 71.*

Chewed under name of "capo" to prevent coughs (Weberbauer).

Ayacucho: Coracora, 2,900 meters, *Weberbauer 5796* (distr. *B. Weberbaueri*). Near Ayacucho, *Weberbauer 5509* (det. Knuth).—Apurímac: Hacienda Catahuacho, 2,900 meters, *Weberbauer 5856*

(distr. *B. verticillata*).—Arequipa: Rocky hill, 2,600 meters, *Pennell 13188* (det. Johnston, *B. Weberbaueri*).—Moquehua: Open mixed formation, 2,700 meters, *Weberbauer 7271* (det. Knuth). In rocks near Moquehua, 1,900 meters, *Weberbauer 7430* (det. Knuth).—Tacna: *Meyen* in 1831, type. Near Tarata, *Metcalf 30361* (det. Leonard).—Puno: Lake Titicaca, *Besser 54*. Bolivia. "Picipinto," "capo."

Balbisia peduncularis (Lindl.) D. Don, Edinb. New Phil. Journ. 11: 277. 1831; 555. *Ledocarpum pedunculare* Lindl. Bot. Reg. 17: *pl. 1392*. 1831. *Cruckshanksia cistiflora* Hook. Bot. Misc. 2: 211. *pl. 90*. 1831.

Branches erect, rather strict, the flowering branchlets 1.5–2 mm. thick, densely tomentulose, the older brown and glabrous; leaves numerous, opposite or nearly, 1–2 cm. distant, sessile, 2–3-parted even to base, the canescent to sericeous-villous lanceolate obtusish entire lobes 7–17 mm. long, 2–3 mm. wide; flowers orange, becoming as much as 7 cm. in diameter, the pedicels 3–5 times longer than the leaves, 2–5 cm. long, 1.25–2 mm. thick, puberulent; involucral leaves 7–12 mm. long, the linear-lanceolate lobules ashy sericeous; petals cuneate-obovate, entire, 3–4 cm. long, 17–20 mm. wide below the rounded apex; filaments one and a half to two times longer than niveous ovary, the anthers oblong; capsule appressed sericeous, half as long as the calyx.—Next to *B. verticillata*, with which Reiche merged it, the oldest name in this group of six narrowly defined closely allied species, races or variants, only one of the three that are neatly demarcated being in Peru. Illustrated, Knuth, l.c. 556.

Arequipa: Near Mejía, (*Guenther & Buchtien 1704*, det. Bruns). Chile.

Balbisia verticillata Cav. Anal. Cienc. Nat. 7: 62. *pl. 46*. 1804; 557. *Ledocarpon chiloense* Desf. Mém. Mus. Paris 4: 551. *pl. 13*. 1818? *L. cistiflorum* Meyen, Reise 1: 470. 1834?

Bushy-branched shrub becoming about a meter tall, the short slender very leafy flowering branchlets densely but minutely puberulent and terminating in a 1–2.5 cm. long peduncle to the solitary showy clear or lemon-yellow flower; leaves 3-parted to base, the linear leaflets obtusish or acute, more or less attenuate basally, often 10–12 mm. long, about 1.5 mm. wide, but sometimes smaller or a few somewhat longer, always with rather prominent midnerve beneath and more or less canescent but rather greenish than white by the dense puberulence on both sides; involucral leaves setaceous,

shorter than or about as long as the narrowly ovate subsericeous calyx lobes, these acutely acuminate, 7–9 mm. long; petals broadly obovate, apiculate at the subtruncate-rounded apex, 1.5–2 cm. long; filaments about as long as the densely silvery hirsute ovary, slightly ovate-oblong anthers about 3 mm. long; pubescent capsules finally little shorter than the persisting sepals.—This is the shrub common in the foothills and it seems doubtful that in typical form it occurs in Arequipa and Tacna as indicated by Knuth; otherwise there is probably only one species concerned and not several, as Knuth maintains.

Lima: Between Obrajillo & Canta, *Née*, type; *Ruiz & Pavón.* Viso, 2,800 meters, *Goodspeed Exped. 11541* (det. Johnston). Valley Río Rimac, 90 km. east of Lima, 3,000 meters, *Goodspeed & Weberbauer 33057* (det. Leonard, *B. Weberbaueri*). Matucana, in rocks, *176* (det. Knuth, *B. Meyeniana*); at 2,389 meters, *Soukup 2063* (det. Standley); *Rose 18664; Ward; Weberbauer 87; 114;* 163, 164. "Capo."

Balbisia Weberbaueri Knuth, Pflanzenreich IV. 129: 557. 1912.

Much like *B. Meyeniana* but uniformly with white or silvery tomentose leaflets that are only 3–6 mm. long; petals truncate apically, not apiculate, at least 2.5 cm. long when grown; filaments longer than ovary; anthers oblong.—If distinct it is a local race of *B. verticillata*, sensu lat. Used for fuel, the stem at base 12 mm. thick and called "capo colorado" (Hinckley).

Arequipa: Arampae to Pampa de Arrieros, 3,200 meters, *Weberbauer 1408*, type; also *Rose 18963* (distr. as *B. verticillata*). Pampa, 3,050 meters, *Hinckley 28* (distr. as *B. verticillata*). Base of Volcano Misti, *Weberbauer 4831;* 128, 129. Near Yura, *Schmidt* (det. Standley); *R. S. Williams 2561* (distr. as *B. verticillata*). Sandy loam in Cacti, Mount Chirvata, 2,200 meters, *Eyerdam & Beetle 22107* (det. Johnston). "Capo colorado."

OXALIDACEAE. Oxalis Family

Reference: Knuth, Pflanzenreich IV. 130: 1930.

Herbs with bulbous or fleshy rhizomes, acaulescent or caulescent, or the Peruvian not infrequently more or less suffrutescent. Leaves alternate, with or without stipules, digitately or pinnately 1–several-foliate, the leaflets entire or cordate-incised; leaves rarely phylloideous. Peduncles axillary, basal, cauline or apical, 1-flowered, ebrac-

teate or often cymose- or pseudo-umbellate and bracteate. Flowers yellow, rose or white, hermaphrodite, regular, 5-merous, usually heterostylous, the 5 free sepals and petals imbricate or the latter valvate, sometimes contorted; glands none; stamens 10(15), more or less biseriate, annulately joined at base, usually all anther bearing. Ovary 5-lobed, 5-celled with 5 distinct styles except in *Hypseocharis* 1, the stigmas capitate; ovules 1-several. Capsules loculicidally dehiscent, sometimes fleshy, 5-lobed, rarely baccate.

Averrhoa carambola L. of the South Pacific, cultivated in Brazil as "Caramboleiro" and widely in all tropics, is a tree with imparipinnate leaves crowded at branchlet-tips, 5–7 pairs of oblique-ovate leaflets, many small flowers in cyme-panicles, especially, baccate fruit. The similar and also cultivated *A. bilimbi* L. has 10–20 pairs of lanceolate leaflets.

Leaves digitately 1-several foliolate or pinnately 3-foliolate rarely phylloideous; stamens 10, biseriate.....1. *Oxalis.*

Leaves pinnate at least in part.

Stamens 10, biseriate; styles 5; caulescent herbs..2. *Biophytum.*

Stamens 15, more or less triseriate; style 1; subacaulescent herbs. 3. *Hypseocharis.*

1. OXALIS L.

Character of the family. Petals contorted. Outer stamens smaller, opposite sepals, inner larger, opposite petals. All Peruvian species are digitately trifoliolate (except *O. fritillariiformis* where they are phylloidiform) and are sessile or equally subsessile except as noted.

The important species in Peru, economically at least, is *O. tuberosa*, the edible tubers commonly known as Oca; other common names and a reference may be found under the species name. The Shamrock, according to the exhaustive paper on the application of that common name by Harold N. and Alma L. Moldenke, Journ. N. Y. Bot. Gard. 47: 49–59. 1946, may as well be *Oxalis* as *Trifolium* or any 3-leaved small plant.

In preparing the following compilation relatively few photographs have been available or types seen; this as usual has been indicated by placing the specimen citation in parentheses. It may be historically useful to remark that the monographer never found it convenient to permit photography and thus belonged to a small minority who followed the opinion of some English curators. It

will be apparent to any user that Knuth's work has not been clear to me and that I have not concerned myself with extra-Peruvian names or revision, both, after all, beyond the scope of this work. The following names are omitted: *O. leptopodes, O. lespedezoides* and *O. Pavonii,* all by G. Don, Gen. Syst. 1: 754, 755. 1831. As their brief characterizations are non-diagnostic they are nomina nuda and so far as known no collections have been assigned to them, those upon which they were based in the Lambert Herbarium by *Ruiz & Pavón* not having been identified by the monographer. There would be no scientific purpose served if they were identified.

Caulescent species, the stems sometimes short, the leaves and peduncles then forming a fleshy-ligneous rhizome or caudex or the former even bulbiform. *O. fritillariiformis,* not elsewhere in key, has leaves in part simple and phylloidiform; all other Peruvian species, leaves with 3 leaflets. (Pseudoacaulescent annuals are included here.) Acaulescent species, page 552.

Stipules lacking or obscure; middle leaflet petiolulate sometimes shortly but the lateral sessile or subsessile.

Leaflets acute to acuminate; shrubs.

Plants glabrous or nearly.

Cymes irregular; pedicels to 2 mm. long.... *O. Tessmannii.*

Cymes regularly parted; pedicels 3–3.5 mm. long. *O. Williamsii, O. Macbridei.*

Plants obviously more or less pubescent.

Flowers small, the sepals about 3 mm. long. . *O. Spruceana.*

Flowers large, the sepals 6–8 mm. long..... *O. Mathewsii.*

Leaflets rounded or retuse at tip, rarely subacute, then plants more or less herbaceous.

Spreading shrub; leaflets only 3–4 mm. wide and long. *O. peruviana.*

Erect or subherbaceous; leaflets usually larger.

Pedicels subumbellate, early congested, finally spreading or pendent; leaflets never subacute or flowers purple.

Stockily branched shrubs; sepals at least acutish, 4.5–6 mm. long.

Leaflets glabrous above, puberulent beneath. *O. hypopilina.*

Leaflets puberulent above, tomentose beneath. *O. velutina.*

Strict, herbaceous or partly ligneous with virgate branches; sepals obtuse, 3–4 mm. long in flower. *O. Poeppigii.*

Pedicels soon pendent or reflexing in racemes or bifurcate cymes, or leaflets subacute, or flowers purple.

Flowers yellow or yellowish, rarely roseate in age.

Leaflets ovate-oblong, subacute (type); half-shrub. *O. juruensis.*

Leaflets rounded or emarginate at tip.

Leaflets broadly obovate or obcordate.

Plants not at all arachnoid.

Stems glabrate or hispidulous.....*O. Cornelli.*

Stems viscid-puberulent; leaflets small. *O. Pickeringii.*

Plants arachnoid toward apex...*O. Hochreutineri.*

Leaflets narrowly cuneate-oblong, retuse. *O. bartolomensis.*

Flowers purple or rose-colored from anthesis.

Sepals about 4 mm. long; leaflets elliptic, rounded both ends.....*O. amazonica.*

Sepals about 3 mm. long; leaflets subovate, obtuse or subacute.....*O. Barrelieri.*

Stipules usually obvious, sometimes completely adnate or petioles merely margined at base, sometimes caducous or obsolete but leaflets in any case all sessile or equally and minutely petiolulate.

Diminutive or fragile sometimes acaulescent annuals, the flowers 3–6 mm. long except in glandular *O. puberula* (juvenile plants *O. bulbigera* might be sought here).

Petioles merely dilated at base; plants setulose-villous or glandular-puberulent.....*O. micrantha, O. puberula.*

Petioles margined by the apically free scariose stipules.

Flowers solitary; stipules conspicuous, usually fimbriate; plants dense.....*O. nubigena.*

Flowers 2 or usually several; stipules 1–2-lacerate; plants stemmed.....*O. cuzcensis.*

Sturdy or succulent, various in duration and habit but, especially if annual, the flowers larger and plants not glandular-puberulent.

Petioles articulate often above the base and stipulately margined, the stipules more or less free at tip; plants never developing a fleshy caudex or rhizome but roots sometimes tuber-bearing.

Stems low, more or less wiry below and usually rooting at the leaf-bearing nodes; leaflets unless in *O. corniculata, O. adpressa,* rarely 5 mm. wide, capsules at least often becoming erect, by the refracted pedicel, cylindric, as long as or longer than broad (cf. also *O. Sternbergii*).

Longer filaments glabrous; peduncles often several-flowered; pods much longer than broad.
O. corniculata.

Longer (or all) filaments hirsute; flowers 1–5; pods much longer than thick.....*O. adpressa.*

Longer filaments pubescent, flowers rarely binate; pods (known) about twice as long as thick.

Pedicels often shorter than 1 cm.; plants forming mats.
O. breviramulosa.

Pedicels usually longer; plants rather open in habit.
O. parvifolia.

Stems usually elongating, sometimes decumbent-ascending toward the base and rooting there; leaflets usually wider than 5 mm.; capsules (known) little longer than broad except *O. Sternbergii* and *O. tuberosa.*

Sepals about 5 mm. long, the flowers less than twice as long; stems succulent-herbaceous, not slender or creeping at base.....*O. villosula, O. spiralis.*

Sepals (5) 6–8 mm. long, the flowers at least twice as long; stems often firm, or slender and creeping at base.

Stems succulent, in herb sulcate, obviously not erect; leaflets usually more than 2 cm. long; roots (complete) with one or more tubers; capsules oblong-cylindric.....*O. tuberosa, O. lucumayensis.*

Stems firm to ligneous, at least becoming so toward base, or in any case capsules ovoid (known), as in the nearly glabrous.

Leaflets mostly about 2.5 cm. long, 1–1.5 cm. wide, flowers usually many.

Erect strigillose-stemmed plant from fascicle of tuberiform roots; shortly bifurcate umbel 20-flowered.....*O. huantensis.*

Scandent or lax plants, at least stems glabrous below, peduncles soon long-bifurcate.

Leaflets oblong, about three times longer than wide, villous beneath, stamens and style glabrous.....*O. subintegra.*

Leaflets cuneate-obovate, glabrous; stamens and styles puberulent.....*O. melilotoides.*

Leaflets obovate, appressed pubescent beneath; stamens glabrous.....*O. medicaginea.*

Leaflets mostly about 1.5 cm. long or smaller; flowers few, borne loosely and irregularly.

Leaflets at least slightly longer than wide, stems at least below not sericeous villous.

Stems ligneous, exfoliating below; filaments sparsely ciliate.....*O. dolichopoda.*

Stems slender, firm or merely subligneous; filaments glabrous or evenly pubescent, at least typically.

Leaflets obcordate, acute but scarcely cuneate at base.

Internodes and petioles typically short; stamens and styles glabrous.
O. mollis(?), *O. lotoides.*

Internodes, petioles short; filaments glabrous, styles not.....*O. medicaginea.*

Internodes and petioles longer; filaments dentate and styles hirsute.
O. phaeotricha.

Leaflets obovate, usually cuneate at base; longer stamens glabrous.

Leaflets 1–2 cm. long, glabrous at least above.....*O. phaeotricha.*

Leaflets smaller, somewhat pubescent above.
O. fruticetorum.

Leaflets broadly obcordate, mostly or all wider than long medially, shortly acute at oblique

base, plants more or less villous.
O. picchensis, O. Sternbergii.

Petioles not margined (sometimes dilated at base, this persisting), the stipules free, caducous or somewhat persisting and more or less densely scarring (sometimes with petiole base) the often fleshy sometimes ligneous stems or caudex.

Stipules caducous or at least not scarring a ligneous stem or a fleshy caudex or rhizome; stems usually procumbent toward base where often rooting, not rarely elongating and clambering.

Leaflets narrower at emarginate apex than at middle.

Leaflets obliquely oblong-elliptic, several cm. long.
O. distincta.

Leaflets oblong-obovate, cuneate at base, 1.5–2.5 cm. long.

Stipules 1 mm. long, caducous, or longer, persisting, completely free, not at all membranous.

Stems 4–5 mm. thick below; styles puberulent.

Sepals to 5 mm. long; stamens glabrous.
O. villosula.

Sepals to 7 mm. long; stamens as styles hirsutulous.....*O. San-Miguelii.*

Stems about 2–3 mm. thick; stamens and styles glabrous.....*O. tabaconasensis.*

Stipules membranous, about 2 mm. long, deciduous.
O. mollis.

Leaflets usually much wider (at least as wide) at lunate to truncate apex than at middle.

Sepals about 6 mm. long; filaments papillose to puberulent.....*O. Ortgiesii.*

Sepals about 4 mm. long; filaments glabrous.
O. rigidicaulis.

Stipules or (and) petiole bases persisting or scarring a fleshy or infrequently ligneous stem or rhizome (or both), the latter rarely bulbiform; peduncles and leaves apically crowded (the latter deciduous) on the short or long very erect succulent stems (usually) or these

lacking, leaves thus pseudobasal from more or less enlarged fleshy to ligneous stems or roots.

Sepals ovate-lanceolate to ligulate or narrower, usually acute; flowers early more or less umbellate but the inflorescence often soon more or less bifurcate, especially in fruit.

Leaflets densely pubescent both sides; stems densely scaly.....*O. cinerea.*

Leaflets glabrous or only lightly pubescent, at least above (*O. polyantha,* unique in Peru by its red umbellate flowers).

Stems clearly ligneous nearly to apex, densely scarred; petioles typically broadly dilated. (*O. Weberbaueri*), *O. Herrerae.*

Stems at least typically succulent unless at or toward the base, but often firm, less densely scarred; petioles more or less dilated especially sometimes (*O. peduncularis, O. Weberbaueri, O. marcapatensis*).

Filaments glabrous; petioles broadly dilated.

Sepals 3.5–4 mm. long, obtuse; cyme umbelliform.....*O. coralleoides.*

Sepals to 6 mm. long, narrowed to obtusish tip; cyme shortly forked...*O. Weberbaueri.*

Filaments more or less pubescent; petioles often slender, filaments not described in *O. Staffordiana, O. polyrhiza.*

Sepals described (by Knuth) as 4–5 mm. long, petals 10–13 mm. long.

Stems elongating; cymes usually more or less bifurcate.*O. ptychoclada, O. peduncularis.*

Stems a few cm. high from thick rhizome; flowers few, umbellate or nearly. *O. Staffordiana, O. modestior.*

Sepals described as 6–8 mm. long, petals (12) 15–20 mm. long (ex Diels, *O. ptyochoclada* would go here).

Petals 12 mm. long; sepals obtuse or rounded. *O. polyrhiza.*

Petals 15–20 mm. long; sepals acute.
O. marcapatensis, O. paucartambensis.

Sepals, at least the outer, broad and more or less dilated at base, especially in fruit.

Rhizome or caudex becoming stout, apically brown-stipulate and in age often producing a scarred stem or stems, simple or shortly branched.

Bracts small, rarely more than 3.5 mm. long, in any case slender; inflorescence various.

Flowers usually many, typically 15–20 mm. long.
O. solarensis, O. megalorrhiza.

Flowers few, sometimes 1–2, rather small.

Petioles elongate...*O. pachyrrhiza, O. polyrhiza.*

Petioles and peduncles shorter than 3 cm.
O. juninensis.

Bracts 5–7 mm. long, membranous-foliate; flowers early subumbellate and large, later ones sometimes small.....*O. sepalosa.*

Rhizome small, bulbiform; diminutive plants with small flowers in umbelliform cymes.

Outer sepals deltoid, wider than long....*O. lomana.*

Outer sepals triangular-rotund, at least as long as wide.....*O. bulbigera.*

Acaulescent species usually bulbous, at least clearly so if the flowers are umbellate, the flowers solitary otherwise. (The introduced *O. pes-caprae* and *O. chasquiensis* only found once, are for convenience omitted from key, both acaulescent.)

Peduncles regularly 1-flowered from a bulb or rarely from a bulbous caudex clothed with petiolar remains; alpine species often near limit of flowering plants.

Stipules and leaf-bases forming a caudex that is apparently, not clearly, a bulb.....*O. eriolepis.*

Stipules and leaf-bases not obviously persisting, the plant clearly from a bulb.

Sepals ecallosed at the often purplish tip; small plants with peduncles shorter or little longer than the leaves.
O. Philippii, O. minima.

Sepals with 2 or more calli, sometimes faint, at tip; peduncles about as long or much longer than leaves.

Stamens apparently glabrous; peduncles and petioles subequal.....*O. oreocharis.*

Stamens pubescent; peduncles usually elongate (1-flowered plants of *O. moqueguensis*, but filaments glabrous). *O. pseudolobata, O. punensis.*

Peduncles terminating in an umbel that is rarely reduced to 1 or 2 flowers, but obviously from a bulb; plants often from high altitudes but subalpine, rarely lowland.

Leaflets more or less emarginate or parted, little if at all wider than long or flowers purple.

Bulb simple, the brown outer scales usually more or less lanate.

Leaflets parted about medially and the lobes spreading; sepals about 6 mm. long.

Lobes oblongish, usually longer than wide, widely divaricate.....*O. bipartita.*

Lobes roundish, little longer than wide, somewhat divaricate.....*O. arenaria.*

Leaflets approximately obcordate or wider than long and emarginate or the lobes suberect; sepals sometimes only 3.5–5 mm. long.

Filaments and sometimes styles puberulent; flowers several to many.

Sepals typically 3.5–5 mm. long; styles glabrous. *O. latifolia.*

Sepals not described; styles as filaments puberulent. *O. carminea.*

Sepals in type 6–8 mm. long; styles and filaments puberulent.....*O. elegans.*

Filaments and apparently also styles glabrous; sepals 6 mm. long.

Flowers white, usually several (3–8).....*O. acromelaena.*

Flowers tinted, few (1–4).....*O. moqueguensis.*

Bulb compound, that is, composed of many small bulbs. *O. Martiana.*

Leaflets broadly deltoid, twice wider than long at subtruncate apex; flowers white; bulb with thick tubercles. *O. Regnellii.*

Oxalis acromelaena Diels, Bot. Jahrb. 37: 423. 1906; 260.

Acaulescent, 7–14 cm. high, from a rotund bulb about 12 mm. in diameter with gray lanceolate scales; petioles few (3–8), to 8 cm. long, rather lax, glabrous or at insertion of the leaflets subglabrous; leaflets glabrous, glaucous-green, broadly triangular, 5–8 mm. long, often about twice as broad or broader, very shallowly incised; peduncles only 1–3, 3–8-flowered, glabrous as pedicels and calyces, 5–11 cm. long, with broadly ovate membranous somewhat erose bracts 2 mm. long; pedicels filiform, 1–1.5 cm. long; flowers 12–14 mm. long, narrowly campanulate from base, the lanceolate sepals deep purple ("nigro-maculata") at the acute tip, (4–4.5) 6 mm. long (Diels), the clawed white petals rounded at apex; glabrous.—Near *O. elegans* HBK. and *O. articulata* Sav. but flowers white, sepals less acuminate, different leaflets (Diels). *O. pazensis* (Rusby) Knuth, 259, has somewhat ciliate leaflets 6–12 mm. long, 10–15 mm. wide, 2–4 mm. incised, flowers only 2–3, about 2 cm. long on pedicels 1.5–2.5 cm. long, sepals about 7 mm. long, obtuse, 5-green-nerved; *O. Buchtienii* (Rusby) Knuth, 260, also from as near as La Paz, has calyx 6 mm. long, the apical tubercle large, red in herb., the leaflets deeply incised, 8–12 mm. long, 9–15 mm. wide, the flowers rather many on pedicels to 1 cm. long. But all three plants seem basically to belong to *O. latifolia* sens. lat.

Junín: Stony places, 3,100 meters, Tarma, (*Weberbauer 2390*, type); 176.

Oxalis adpressa Knuth, Pflanzenreich IV. 130: 160. 1930. *O. parvifolia* DC. var. *pluriflora* Knuth, Notizbl. Bot. Gart. Berlin 7: 301. 1919.

Densely leafy annual with many tortuous ascending or procumbent stems 1–1.5 mm. thick, branched at base, more or less spreading pilose, often with short branchlets in the leaf-axils; leaflets sessile, obcordate-reniform, to 10 mm. wide, 5–6 mm. long, usually one-third to two-fifths incised, with rounded lobes, broadly cuneate at base, sparsely pubescent both sides, the margins rather rigidly ciliate; petioles to 2 cm. long, sparsely hirsute; stipules adnate, 2 mm. long; peduncles also from lower axils, to 2 cm. long, hirsute or glabrate, with acute linear bracts to 4 mm. long, the umbel 1–5-flowered, its pedicels to 6 mm. long, hirsutulous as the calyx, this with oblong-lanceolate obtusish sepals, often purplish and 3.5 mm. long; petals pale yellow, about twice as long; stamens hirsutulous, the longer exserted from calyx; ovary hirsute, the capsule 9 mm.

long, 2 mm. thick, with brown rugose depressed seeds 0.75 mm. in diameter.—Species very variable when small, the peduncles and pedicels short, 1-flowered, when elongate these well-developed (Knuth). Unknown to me; may be a mixture or otherwise a variety of *O. parvifolia* as first designated. Bolivian species said to be related are *O. soldanelliflora* Knuth, 160, and *O. Bangii* Rusby, 161, the former with subfiliform creeping stems, deep yellow purple-veined petals 15 mm. long, the latter with also large flowers but reddish-pilose. Type from northern Bolivia.

Peru: (Undoubtedly). Ecuador; Bolivia.

Oxalis amazonica Prog. in Mart. Fl. Bras. 12, pt. 2: 503. 1877; 63. *Acetosella amazonica* (Prog.) Kuntze, Rev. Gen. 1: 92. 1891.

Erect or suberect annual, the firm slender stems strict and minutely appressed puberulent above where moderately leafy, the nearly filiform subopposite or fasciculate petioles about 3.5 cm. long; leaflets glabrous, broadly oblong-ovate or elliptic, rounded both ends, 2–3 cm. long, 1.5 cm. wide, the medial with petiolule 5–8 mm. long; peduncles often 3–4 in an apical fascicle, erect, 3–5 cm. long, bifurcate, the branches in fruit about 1 cm. long, usually 4–6-flowered; bracts 1 mm. long, subulate; pedicels 2–3 mm. long, recurved in fruit; sepals lanceolate, acute, minutely puberulent, 4 mm. long, the narrow-based obovate violet petals about twice as long; filaments glabrous, the longer with one lateral medial tooth; styles hirsutulous; capsules elongate-ovate, acute, 7 mm. long, with 3 rugose seeds in each cell.—F.M. Neg. 32441.

San Martín: Villa Nova and Tocache, *Poeppig*, type.

Oxalis arenaria Bert. Merc. Chil. 16: 739, 740, ex Colla, Mem. Acc. Torino 37: 48. 1834; 265. *Acetosella arenaria* (Bert.) Kuntze, Rev. Gen. 1: 91. 1891. *Sassia tinctoria* Molina, Sagg. Nat. Chile 146. 1782, not Poepp. ex Prog. in Mart. Fl. Bras. 12, pt. 2: 479. 1877. *O. pseudoarenaria* Knuth, Repert. Sp. Nov. 38: 196. 1935?

Acaulescent from a rotund-oblong bulb to 2 cm. long, the ovate-lanceolate acutely acuminate scales little or not at all lanate within, 1.5 cm. long; leaves only 3–6, on glabrous or sparsely pilose petioles 6–11 cm. long, the broadly obcordate leaflets usually pilose at least beneath, in Peru often glabrate, to 2 cm. long, 17 mm. wide, incised two-fifths or nearly to the middle with acute sinus, the lobes rounded; peduncles usually 1–several dm. long, subglabrous with simple 2–7-flowered umbel; bracts deltoid-lanceolate or narrower, acutely

acuminate, to 3 mm. long; pedicels often lax, subfiliform, to 4 cm. long; sepals linear-lanceolate, obtuse, or acute, thick-red-callose at tip, finally 6–7 mm. long; corolla purple, four times longer than calyx; styles densely puberulent.—*O. pseudoarenaria* if recognizable may include all Peruvian plants, but ex char. there appears to be no basic distinction; less pilose, bracts nearly linear, acute, 4.5–5 mm. long, corolla 3 times longer are all variations that may be states of development; for example, it is noticeable the calyx is longer as the flower matures. *O. longiflora* L., cited here and also under *O. Acetosella* L. by Knuth, is apparently from type locality, "Virginia," more likely referable to the latter. F.M. Neg. 19189.

Junín: Huancayo, *Soukup 1893* (det. Leonard).—Cuzco: Sailla, Quebrada de Oropeza, (*Herrera 2688*). Hacienda Churú, Paucartambo Valley, 3,500 meters, *Herrera 1398 pt.* Yucay, 3,000 meters, Valle del Urubamba, (*Herrera 2275*); *1369* (det. Knuth).—Arequipa: *Raimondi* (det. Knuth). Prov. de Anta, *Herrera 3632.* Huascao, *Herrera 3109a.* Near Cuzco, 3,700 meters, (*Stafford*, type, *O. pseudoarenaria*). Bolivia; Chile; Argentina; Paraguay.

Oxalis Barrelieri L. Sp. Pl. ed. 2. 624. 1762; 65. *Lotoxalis Barrelieri*, Small, N. Am. Fl. 25, pt. 1: 49. 1907.

Becoming a dm. to several dm. tall, glabrous or glabrescent or the leaflets sparsely pubescent beneath, these ovate-oblong-lanceolate, usually 1.5–4.5 cm. long, obtuse or acute, the lateral evidently smaller; peduncles mostly longer than the petioles, the finally glabrous pedicels 3–4 mm. long; sepals 3–3.5 mm. long, the outer oblong-lanceolate, glabrous or barbate at tip; petals 6–9 mm. long; longer filaments appendaged above the middle and there puberulent; styles pubescent; capsules broadly oblong, 5–7 mm. long.—After Small.

Peru: (Possibly). West Indies and northern South America.

Oxalis bartolomensis Knuth, Notizbl. Bot. Gart. Berlin 7: 302. 1919; 124.

Slender glabrous erect simple stemmed annual to a dm. high, leafy above the middle; petioles often nearly 3.5 cm. long, the middle petiolule to 2.5 mm. long, the lateral 1 mm. long; leaflets elongate-obcordate, often 11 mm. long, 7 mm. wide near the obtusely incised tip, the lobes rounded; lateral leaflets mostly oblique, the outer lobule reduced; peduncle 5–7.5 cm. long, without the flowering branches 3–4 cm. long; bracts linear, membranous, obtuse,

1 mm. long; pedicels to 2.5 mm. long, often persisting; sepals to 4 mm. long, lanceolate acute; petals yellow or pale, 8.5–10 mm. long, narrowly lanceolate, rounded; filaments described as glabrous, as the styles shorter than sepals.—Filaments pubescent in Pennell plant; probably there is an earlier name for this in the vicinity of *O. frutescens* L., 73, or *O. euphorbioides* St. Hil., 50.

Lima: In cactus-shrub formation, 1,500 meters, San Bartolomé, *Weberbauer 5296*, type. Quive, *Pennell 14301* (det. Knuth). Between Ambar and Huacho, 1,200 meters, *Stork 11469* (det. Johnston, *O. lotoides*).—Moquehua: Mount Estuquiña, 1,600 meters, *Weberbauer 7446* (det. Knuth).

Oxalis bipartita St. Hil. Fl. Bras. 1: 125. *pl. 25.* 1825; 263. *Acetosella bipartita* (St. Hil.) Kuntze, Rev. Gen. 1: 92. 1891.

Glabrous except petiole tips or the inflorescence obscurely puberulent, acaulescent, 1–2 dm. high from a rotund bulb often 8 mm. in diameter, simple and nearly without scales; leaves 5–20, lax, the petioles 5 (–15) cm. long with a fascicle of brown trichomes at the juncture with the leaflets, these green, 12–20 mm. long, bilobed for more than half their length, the lobes divaricate, often 1 cm. long, 2 mm. wide, oblong-linear; peduncles few (1–4), often 5–7 cm. long, rarely 26 cm. long, the umbels often irregular and 2–12-flowered with many narrow bracts 3 mm. long, red-callose apically as the oblong-lanceolate or linear acutish sepals, these 5–6 mm. long; pedicels 2– nearly 3 cm. long; corolla conic-campanulate, at least four times longer than the calyx, violet, the petals more or less retuse; larger stamens nearly two times longer than sepals.

Cuzco: Hacienda Churú, Paucartambo Valley, 3,500 meters, *Herrera* (det. Knuth). Cuzco, 3,000–3,600 meters, *Herrera* (det. Knuth). Calca, *Vargas 164*. Prov. de Anta, *Herrera 3634*.—Apurímac: Upper Marino Valley, *Goodspeed Exped. 10637*. Prov. Abancay, 2,800 meters, *Vargas 9612*. Prov. Grau, *Vargas 9782*. Uruguay; southern Brazil.

Oxalis breviramulosa Rusby, Mem. Torrey Club 3, pt. 3: 13. 1893; 165. *O. guaquiensis* Knuth, Meded. Rijks Herb. Leiden 27: 63. 1915, fide Knuth.

Suffruticose, about 5 cm. high, the procumbent or ascending stems to 10 cm. long and 1.5 mm. thick, densely foliose, subligneous and subglabrous below, densely glandular-subviscous above; leaves congested on the very short branchlets, the sessile reniform glaucous

rather fleshy leaflets incised below the middle, 3 mm. wide, half as long, glabrous above, somewhat lanate beneath; petioles 5 mm. long, nearly filiform, appressed pubescent, the stipules nearly completely adnate; flowers solitary on pedicels only 1–2 mm. long; sepals ovate, obtuse, glabrous, often purple-margined, 2–3 mm. long, the yellow petals to 9 mm. long, broadly cuneate, more or less retuse; larger stamens densely ciliate, much shorter than sepals.—Type of *O. guaquiensis* from stony places on the Bolivian side of Lake Titicaca. *O. bisfracta* Turcz., 142, of Bolivia, is apparently related.

Puno(?): Probably about Lake Titicaca. Bolivia.

Oxalis bulbigera Knuth, Notizbl. Bot. Gart. Berlin 7: 306. 1919; 200. *O. microbolba* Knuth, Repert. Sp. Nov. 23: 280. 1927.

Acaulescent, 4–5 cm. high from a bulbous root 7 mm. long, 4–5 mm. thick; leaves few to many (about 20), rather fleshy, the equal leaflets triangular-obcordate, 5–10 mm. long and broad, with very wide 1 mm. deep sinus, glabrous above, arachnoid beneath; peduncles sparsely pilose, little if at all exceeding the leaves, bearing a 4–5 (–10)-flowered congested umbelliform cyme with linear obtuse pilose bracts 2–3 mm. long, the arachnoid pedicels only 1–3 mm. long; inner sepals lingulate as long as the outer broadly ovate ones, these 2.5 mm. wide and long or 3.5–4.5 mm. in fruit and equaling the capsule, this with 3–4 seeds in each cell; corolla about 5 mm. long, yellow.

Lima: Mount Morro, near Chorillos, *Weberbauer 5688*, type. Mill by Barranco, lower edge of lomas, *Weberbauer 5699* (root not enlarged, first year, acc. to coll.). Lee of large rocks, north of Barranca, *Worth & Morrison 9112* (det. Johnston). Common over plains south of Huacho, *Goodspeed Exped. 9235* (det. Johnston). Loma Ancón, 800 meters, *Soukup 2126*. Near Lima, *Rose 19472* (type, *O. microbolba*); also *18574*. Stony slopes seaside hills, Chorillos, *5854* (det. Knuth, *O. microbolba*).

Oxalis carminea Knuth, Notizbl. Bot. Gart. Berlin 7: 312. 1919; 261.

Acaulescent, glabrous, from a rotund bulb about 1 cm. in diameter, its lanceolate very acute scales rarely lanate within, to 1 cm. long; leaves 3–8, the petioles about 4 cm. long, the leaflets broadly obcordate, often 1.5 cm. wide, 1 cm. long, sometimes larger, one-fourth to one-third incised with rather acute sinus, the lobes rounded; peduncles 7–13 cm. long, about 5-flowered, the more or less irregu-

larly ovate bracts with wide membranous margins; pedicels 5–12 mm. long, often refracted; sepals lanceolate, acutish, with two red thick calli; corolla pale red, three times longer than calyx; stamens and styles minutely puberulent.—Much like *O. araucana* Reiche but lateral nerves of the leaves obsolete (Knuth); apparently belongs to *O. latifolia*, sens. lat., but type not seen.

Lima: Below Matucana, 220 meters on stony outcrops, (*Weberbauer 5205*, type).

Oxalis chasquiensis Knuth, Pflanzenreich IV. 130: 437. 1930.

Acaulescent with about 8 leaves and 2 or 3 peduncles from the neck of a horizontal rhizome 3–5 mm. thick, the roots long, few; petioles 4–10 cm. long, sparsely pilose, the stipules lanceolate, 4 mm. long, acute, hirsute, in part adnate; leaflets sessile, equal, more or less appressed pilose both sides of the margins, densely ciliate and narrowly marginate, obcordate, obtusely 2 mm. incised, to 12 mm. long and 10 mm. broad; peduncles 6–8 cm. long (without the 2 flowers), hirsute as pedicels, these filiform, 7–17 mm. long, and calyces; bracts subulate, very acute, 4 mm. long; sepals narrowly lanceolate, acute, 8 mm. long; petals yellow, 14 mm. long, long-clawed; stamens and styles puberulent.—Allied to the Argentinian *O. lasiopetala* Zucc. with violet flowers; and thus also to *O. Regnellii* Miq. which compare.

Huánuco: Chasqui, *3288*, type.

Oxalis cinerea Zucc. Denkschr. Akad. Muench. 9: 156. 1823–24; 194. *O. Haenkeana* Zucc. Abh. Math. Nat. Cl. Akad. Muench. 1: 233. 1829–30, not Spreng. 1827.

Stems 2.5–5 cm. high, thick, simple or with few basal branches, densely imbricate-scaly with pubescent rudiments of petioles; leaves many at stem tips the sessile leaflets acutely incised with rounded lobes, equal, appressed sericeous villous both sides; petioles erect-spreading, 4–5 cm. long, villous, the base dilated-amplexicaul; peduncles strict, 3–4-flowered with filiform pedicels articulate a little above the base, villous as the minute subulate bracts; sepals lanceolate, acute, hirsute; corolla large, sordid yellow with purple veins, three times longer than the calyx; filaments and styles hirsute. —The locality "Guanocco" is probably a misreading for Huánuco. The var. *peruviana* Walp. Nov. Act. Acad. Leop.-Carol. 19: Suppl. 1: 319. 1843 of *O. Haenkeana* has more obtuse leaflets, pedicels two times shorter than calyx and, as the species was as unknown to

Knuth as to me, it is quite possibly a pubescent state of *O. paucartambensis* or *O. pedunculares*, sens. lat.

Huánuco: (*Haenke* in herb. Sternberg, type).—Cuzco: Sicuaní, 3,550 meters, Prov. de Canchis, (*Hicken*).

Oxalis coralleoides Knuth, Pflanzenreich IV. 130: 433. 1930.

Stems many from neck of a branched rhizome, rather fleshy, glabrous, 5–7 cm. high, leafy above, below clothed with petiolar bases 2–4 mm. long; petioles to 3 cm. long, broadly dilated, glabrous, the lanceolate acute stipules ciliate, 4 mm. long; leaflets sessile, triquetrous-obcordate, 5 mm. wide, 6 mm. long, fleshy, glabrous above, ciliate beneath and on the often reddish margin, 1–2 mm. incised with obtuse sinus; peduncles 6–8 cm. long, inflated below the middle, glabrous, the nearly regular umbel 3–6-flowered; bracts subulate, sparsely ciliate, 3–4 mm. long; pedicels 6–10 mm. long, filiform, ciliolate; sepals rather ovate, obtusish, often purplish, scabriusculous with minute hyaline trichomes; petals to 12 mm. long, red-veined, yellow, obovate; stamens glabrous; seeds 2–3 in a cell.—Allied to *O. Herrerae* Knuth, fide author. I doubt if the Cuzco specimen belongs here. The Indians add it to the drink Chicha to induce sleep (Herrera).

Junín: Tarma, 4,000 meters, *1060*, type.—Cuzco: Machu-picchu to Ollantaytambo, 2,100–2,800 meters, (*Herrera 2085*). "Macha-macha" (Herrera).

Oxalis Cornelli Anderss. Vet. Akad. Handl. Stockh. 1853: 246. 1855; 65. *O. sepium* St. Hil. var. *glandulifera* Norlind, Arkiv. Bot. 20A, pt. 4: 9. 1926. *O. ramulosa* Knuth, Notizbl. Bot. Gart. Berlin 7: 290. 1919. *O. Haughtii* Knuth, Repert. Sp. Nov. 40: 291. 1936. *O. peruviana* [Standley] Knuth, Pflanzenreich IV. 130: 67. 1930.

Often flowering as a slender annual, becoming perennial and subligneous below, usually erect or strict, to several dm. tall or in some habitats prostrate with slender vine-like stems, glabrescent but more or less pubescent especially the younger parts with acicular sometimes viscid trichomes; petioles 1–4 cm. long; medial petiolule 3–8 mm. long; leaflets broadly obovate or nearly rotund, rounded or slightly retuse apically, usually about 1.5 cm. long, 1 cm. broad, often smaller and in vigorous plants to 3.5 cm. long, 3 cm. wide, more or less glaucous, often firm; peduncles upper-axillary and terminal, ascending or erect, 2.5–6 cm. long, the bifurcate cyme sometimes 7 cm. long; bracts linear, acute, 1.5–2 mm. long; pedicels

1–2.5 mm. long; sepals lanceolate, 5-nerved, glabrous, 4–5 mm. long, the orange-yellow obovate rounded petals about twice as long; larger stamens subequal, the filaments ciliate, the much shorter smaller stamens glabrous, half as long as the ciliate styles; capsules pendulous, about 7 mm. long, 5 mm. thick, with several rugose seeds in each cell.—This follows the interpretation of Svenson, Amer. Journ. Bot. 33: 455. 1946, who, besides the synonyms above (except *O. Haughtii*) includes *O. Barrellieri* sensu Knuth, 65, in part which, according to him, is a "quite different purple-flowered species." *O. Haughtii* seems to me to be the vernal state. Apparently *O. amazonica* Prog., 63, sensu Knuth, likewise is referable here.—Illustrated, Svenson, l.c. 456.

Piura: Toward Hacienda Nomala in half shrub formation, 200 meters, *Weberbauer 5956* (type, *O. ramulosa*). Paita, *Pennell 14816* (det. Knuth, *O. peruviana* and *O. sepium*, var.). Pariñas Valley, *Haught 281* (type, *O. Haughtii*). Near La Brea, (*Haught & Svenson 11590*, det. Svenson).—Huancavelica: Somate, *Townsend 827* (type, *O. peruviana*). Talara, *Haught 46; 282*.—Libertad: Entirely prostrate with slender stems, Chicama Valley, *Smyth 37* (det. Leonard, *O. peruviana* [Standl.] Knuth). Ecuador; Galapagos; Brazil?

Oxalis corniculata L. Sp. Pl. 435. 1753; 146. *Xanthoxalis corniculata* (L.) Small, Fl. S. E. U. S. 667. 1903.

Loosely pilose to nearly glabrous, rhizomatous, diffuse to prostrate, the usually numerous very foliose stems often congested at base and 1–3 dm. long, commonly more or less rooting; leaflets broadly cuneate-obcordate, to one-third incised, pilose, especially beneath and marginally, small, to about a cm. wide and long, or larger, the petioles much longer, the 1–6-flowered peduncles 1–7 cm. long; bracts acute to acuminate, 1–5 mm. long; pedicels short or often about as long as the long peduncles, hirsutulous-puberulent as the calyces or glabrate, the sepals ecallose, about 5 mm. long; corolla 8–10 mm. long, pale yellow; larger filaments glabrous; capsules erect, slender, 12–15 mm. long, appressed pubescent.—Widely distributed around the world in both temperate and subtropical regions, including Ecuador and Bolivia. Similar and probably occurring is *O. stricta* L., 143, stems erect or decumbent, corolla 5–10 mm. long, pubescence appressed, leaflets nearly glabrous, bracts 1–1.5 mm. long, following Knuth's interpretation of these variable species. But see also Wiegand, Rhodora 27: 113, 133. 1925. There is a purplish colored form (or distinct species?), *O. corniculata* L. var. *atropurpurea* Planchon, Fl. Serres 12: 47. 1857, which a

contemporary without explanation has changed to a variety of *O. europaea* Jord. under *Xanthoxalis*, the former, fide Knuth, *O. stricta* L. var. *europaea* (Jord.) Knuth. But cf. Wilmott, Journ. Bot. 53: 172–174. 1915. There seem to be a number of variants, maybe distinct but not surely in Peru, for example, *O. filiformis* HBK., 169, Ecuador, and many others, even in different sections by the monographer, maybe correctly, certainly not clearly.

Lima: Irrigation ditch bank, *507* (det. Knuth).—Huánuco: At Huánuco, *Soukup 2230* (distr. *O. stricta?*).—Cuzco: Hacienda Churú, 3,500 meters, Prov. de Paucartambo, (*Herrera 1382*). Nearly cosmopolitan. "Vinagrillo."

Oxalis cuzcensis Knuth, Notizbl. Bot. Gart. Berlin 7: 303. 1919; 124. *O. ollantaytambensis* Knuth, Repert. Sp. Nov. 23: 142. 1926; 124.

Small rather succulent annual normally becoming a dm. or so high, early abundantly leafy and floriferous nearly from the base, glabrous or very sparsely puberulent unless in variant; petioles to 2 cm. long with membranous acute stipules to 3 mm. long, long-adnate; leaflets obcordate, exactly cuneate at base, to 2 mm. incised apically, pale green, to 11 mm. long, often smaller, nearly as wide; upper peduncles to 4 cm. long, cymosely parted and often bifurcate, usually (in type "cymose, globosely stacked at summit"), 8–14-flowered; bracts 1–2 mm. long, very acute; pedicels filiform, often nodding, 3–10 mm. long; sepals narrowly lanceolate, obtuse, nearly membranous, often violet tinged and with a fascicle of trichomes at tip, the yellow lanceolate-cuneate petals 6 mm. long; styles as long as sepals, longer than stamens, the often slightly exserted capsule with few seeds.—In spite of the name of the apparent synonym a collection from Bolivia is its type. More material may prove me wrong in regarding *O. cuzcensis* as based on undeveloped plants, probably so small because starved; however some peduncles are 1-flowered. Except as indicated determinations by Knuth, as *O. ollantaytambensis*. The Argentinian *O. membranifolia* Knuth, Repert. Sp. Nov. 40: 291. 1936, allied by the author to the Chilean *O. rosea* Jacq., 126, and to this, has yellow petals two and a half times longer than the 5–7 mm. long sepals, minor differences that may suggest variability within *O. rosea* and wider distribution, sens. lat. Here would be sought *O. yungasensis* Rusby, 159, hirsute, and apparently approached by *Herrera 2997a.*

Lima: Shrubby canyon, 3,000 meters, *3096.*—Junín: In rocks, Yanahuanca, *1216*. Huancayo, *Soukup 1896* (det. Leonard, *O. ol-*

lantaytambensis).—Huancavelica: West of Huanta in gravelly sand, *Stork & Horton 10810* (det. Standley, *O. ollantaytambensis*).—Cuzco: In rock-wall, San Sebastian, *Pennell 13633*. Valle del Apurímac, *Herrera*. Hacienda Pfuyucalla, 3,400 meters, Paucartambo Valley, *Herrera 2997a* (det. Knuth, *O. pygmaea*). Below Tres Cruces, shrubby grass steppe, 3,500 meters, *Weberbauer 6921*, type. Valle del Urubamba, Ollantaytambo, 3,000 meters, *Cook & Gilbert 350; 354*.—Puno: Aziruni, *Soukup 1038*. Bolivia; Colombia (?). "Oca-oca."

Oxalis distincta Knuth, Repert. Sp. Nov. 40: 292. 1936.

A succulent herb with subhirsute stems, petioles and peduncles, the first 3–4 dm. high, erect, leafy from near the 5 mm. thick base, the second to 8 cm. long, 1.5 mm. thick, the last at least as long to even 10.5 cm. and bibranching apically into an umbelliform cyme 2 cm. across; stipules linear, 1–2 mm. long, often persisting; leaflets sessile, subglabrous or pilose especially marginally, rhombic-oblong, 5.5 cm. long, 2.5 cm. wide, subequal, retuse with mucro 1 mm. long; lower pedicels to 1 cm. long; bracts subulate, very acute, 4 mm. long, puberulent, persisting; sepals narrowly lanceolate, acute, to 8 mm. long, shortly pilose, the yellowish cuneate-dilated petals to nearly twice as long; stamens pubescent and with styles about as long as sepals.—Section *Clematodes* and in form of leaves like *O. subintegra* Knuth, but obviously diverse by habit and size of all parts (Knuth).

Junín: Yapas, about 1,500 meters, in thick wood along Pichis Trail, *Killip & Smith 25586*, type.

Oxalis dolichopoda Diels, Bot. Jahrb. 37: 423. 1906; 179.

Stems ligneous, simple or rarely forked, 4–10 dm. high, 3–4 mm. thick, densely foliate above the middle, dark brown and glabrous below, reddish tomentose-villous above; leaflets pilose but green above, fuscous sericeous tomentose beneath, nicely obovate, mostly 8–14 mm. long, 5–12 mm. wide, rather acutely to one-fourth incised, without punctae or calli; petioles 1.5–2 cm. long, reddish tomentulose and with 4–6 mm. long stipules; peduncles many above, 3 cm. long, reddish puberulent as pedicels (1 cm. long) and sepals, these 6–7 mm. long, linear-lanceolate, obtuse or subrotund at tip; bracts acute, 3 mm. long; flowers about 14 mm. long, campanulate, yellow, the petals retuse-rounded; larger stamens very sparsely pilose or glabrate, little longer than sepals; styles glabrous.—This may be the older ligneous state of another species but, as the author observed, apparently distinct in habit, form of leaves and in indument.

Huánuco: Southwest of Monzón, 2,200 meters, (*Weberbauer 3707*, type); among low bushes in sphagnum, Playapampa, 3,000 meters, *4484* (det. Knuth); 94; 255.—Cuzco: Cerro de Cusilluyoc, "Pillahuata," 3,000 meters, *Pennell 14107* (det. Knuth). In woods, "Pillahuata" to Acanacu, 2,600 meters, *West 7066* (det. Johnston). Bolivia.

Oxalis elegans HBK. Nov. Gen. & Sp. 5: 182. *pl. 466*. 1821; 252.

Acaulescent from a bulb, its scales very long-lanate; glabrous (or nearly) even to the lanceolate (6–8 mm. long) sepals but these marked at the acuminate tip by 2 lineate glands; peduncles 5–15 cm. long, 2–6-flowered, the filiform pedicels 16–28 mm. long; leaflets subsessile, broadly subrotund-obovate, subtruncate, rather acutely emarginate, subequal, membranous, violet (glandular, Progel) beneath, 12 mm. wide, 8 mm. long, the lateral a little oblique; petioles filiform, nearly glabrous, 7.5 cm. long; flowers subumbellate, about 2 cm. long, violet with black spots in the throat; bracts lanceolate, 3 mm. long; petals rounded apically; longer filaments puberulent above; styles pubescent.—After HBK., the type from Loxa. Perhaps *O. atroglandulosa*, here included in *O. latifolia*, belongs here or is distinct, fide Knuth, by its dark callose instead of reddish sepal tips and many-flowered umbels, scarcely impressive specific characters, but type not seen in comparison. All the specimens cited under *O. latifolia* for expediency, in spite of the larger leaflets, probably ex char. belong here, and indeed, the Wilkes Exped. collection was so named by Gray.

Peru: Probably. Ecuador.

Oxalis eriolepis Wedd. Chlor. And. 2: 290. 1857; 246.

Bulbous acaulescent, the oblong reddish bulb scales with lanate margins, the stipules and petiole bases persisting; petioles elongate; leaflets obcordate-bilobed, 5 mm. long, at least twice as wide, sessile, glabrous but cellulose-lacunose beneath; stipules connate to tips, lanate on margins; peduncles 1-flowered, glabrous, bibracteolate below the summit; sepals long or lanceolate, often acute, 5 mm. long, violet margined, more or less red callose at tip, glabrous or puberulent, less than half as long as the purple or white petals.—The collection mentioned by Weberbauer, 221, is cited by Knuth as *O. Philippii* but the reference is given under this name. Weddell cites first Jameson from near Quito, not seen; no bulb on the Mandon photo. Possibly material is mixed. Apparently *O. pachyrrhizus* and *O.*

juninensis are allied, and maybe *O. chasquiensis*, not seen. It may well be *O. minima* as interpreted by me at least in part. F.M. Neg. 26311 (*Mandon 842*).

Cuzco: Sicuaní, 3,550 meters, Prov. de Canchis, (*Hicken*). Prov. del Cercado, (*Herrera*).—Puno: Between Limbani and Aqualani, 2,700 meters, *Vargas 1286?* Bolivia; Ecuador. "Occa-occa."

Oxalis fritillariiformis Knuth, Notizbl. Bot. Gart. Berlin 7: 297. 1919; 105.

Erect, 4 dm. high, the simple stem to 3 mm. thick, puberulent below, more or less densely tomentose-subhirsute above, where densely clothed with leaves and peduncles but the former not entirely lacking toward the base; leaves mostly reduced to phylloidea, 10–13 cm. long, 2.5 cm. wide, gradually narrowed to base into a winged pseudo-petiole 1.5 cm. long, more or less abruptly contracted at tip and often acuminate, with acumen 3 mm. broad at base, the very narrow margin minutely but densely ciliolate, often apically bearing 3 leaflets 8 mm. long, half as wide, ovate, obtuse, on petiolules to 1 mm. long; peduncles filiform, 3–4 cm. long, erect, racemosely bifurcate at tip, the branches 1–1.5 cm. long, densely marked by pedicel scars, 8–15-flowered; bracts subulate, 1 mm. long; pedicels capillary, 3 (4) mm. long; sepals lanceolate, acutely acuminate, puberulent, to 3 mm. long, the yellow petals to three times longer, clawed, oblong-lanceolate, obtuse; larger stamens longer than calyx, not very ciliate; capsule 3 mm. thick, lightly depressed, glabrous.—Nearly *O. daphniformis* Mikan, 105, of eastern Brazil but differs in stems hirsute above, more or less leafy below, larger flowers, etc. (Knuth). F.M. Neg. 28343.

Río Acre: San Francisco, *Ule 9470*, type.

Oxalis fruticetorum Diels, Bot. Jahrb. 37: 424. 1906; 135. *O. Lechleri* Knuth, Pflanzenreich IV. 130: 134. 1930.

Scandent in shrubs, otherwise procumbent, the reddish-brown subligneous stems to 1 meter long, glabrous below, to 2.5 mm. thick, sparsely spreading, pubescent to subtomentose above, with rather few divaricate slender subligneous branches that are mostly naked except toward the flowering tips, the somewhat hirsute leaves on petioles only about 1 cm. long; leaflets all sessile and subequal, about 7 mm. long and 3–5 or 6 mm. wide, slightly narrowed at base, obovate, apically moderately incised with obtuse or acute sinus, nearly glabrous above; stipules 5 mm. long, about one-fourth free,

lanceolate; peduncles (1) 3–4.5 cm. long, sparsely spreading pilose as pedicels, these 7–10 mm. long, refracted in fruit, and sepals, these oblong-lanceolate, obtuse, or subacute, hyaline margined to 6 mm. long; umbels irregular, (1) 4–6-flowered; petals at least 12 mm. long, broadly cuneate to retuse-rounded tip, yellow with reddish nerves; larger stamens glabrous, scarcely denticulate and little longer than calyx.—With the Pennell collections before one it appears that *O. Lechleri* was based on a diminutive upper portion of the plant earlier named by Diels which the latter rightly compares with the Colombian *O. scandens* HBK., the Peruvian plant more ligneous with smaller leaflets pilose beneath. F.M. Negs. 26314; 26329 (*O. Lechleri*).

Cajamarca: In shrubs, Hacienda La Tahona, Hualgayoc, 3,100 meters, *Weberbauer 4028*, type; 261. Sandy soil, Socota to Tambillo, Prov. Cutervo, 3,200 meters, *Stork & Horton 10169*. Sprawling in humus or moss, 3,100 meters, Mito, *1845* (det. Knuth). On mossy trees, 4,000 meters, Tambo de Vaca, *4379* (det. Knuth).—Cuzco: Mossy bank, 3,800 meters, Cerro de Cusilluyoc, *Pennell 13819* (det. Knuth, *O. Lechleri*); also *14100* at 2,800 meters in thickets.—Puno: Prov. Sachapata, *Lechler 2708* (type, *O. Lechleri*). Ecuador.

Oxalis Herrerae Knuth, Pflanzenreich IV. 130: 115. 1930.

Becoming suffrutescent, a dm. or so high, with divaricate branches to 5 mm. thick and dark brown bark; older branchlets glabrous, the younger nearly aculeate with many lanceolate stipules at base of petioles, the former 2 mm. long, the latter often 2 cm. long and variously foliose-dilated, glaucous, glabrous and fleshy like the sessile rotund-obcordate leaflets that are abruptly contracted toward the base, often minutely but not conspicuously excised, 5 mm. long, 4 mm. wide; peduncles often 1 dm. long, terminating in a 5–7-flowered 2-branched cyme, the branches to 2 cm. long; bracts subulate, 2 mm. long, minutely glandular as the unequal pedicels (to 5 mm. long) and as long, narrowly lanceolate acute sepals; petals reddish, to 12 mm. long, spathulate, more or less retuse; shorter stamens as long as the sepals, the stamens and styles puberulent.—Species most distinct in the dilated petioles (Knuth). According to the collector it may be narcotic. It develops into a gnarled or stockily branched shrub or the stems sometimes virgate; an extreme form, or distinct species is villous with subentire leaflets, *Herrera 3507*, Machupicchu, but det. Knuth, *O. coralleoides*.

Cuzco: Ollantaytambo, Valle del Urubamba, *Herrera 3356; Pennell 13658* (both det. Knuth); *West 6474* (det. Johnston).

Hacienda Silque, Valle del Urubamba, 2,950 meters, (*Herrera 1757*, type).—Puno: Rocky shaded stream bank, Oconeque, Prov. Sandía, *Metcalf 30608* (det. Leonard, *O. Herrerae*). "Macha-macha."

Oxalis Hochreutineri Macbr. Candollea 6: 9. 1934. *O. patula* Knuth, Notizbl. Bot. Gart. Berlin 7: 302. 1919; 123, not Eckl. & Zeyh. Enum. 1: 87. 1836.

Annual, distinctive by the long arachnoid indument on the many stems (these erect or ascending-divaricate, 10–18 cm. long), pedicels and calyces; leaves sometimes fascicled on the more or less spreading branches, most abundant above; leaflets glabrous, broadly obcordate, more or less cuneate at base, rounded or barely incised apically, to 1 cm. long, slightly wider, the petioles often 2–3 cm. long; peduncles 2–5 cm. long, with simple or bifurcate umbel of 3–8 yellow flowers, the ovate lanceolate somewhat arachnoid bracts 3–4 mm. long, the pedicels to 5 mm. long or nearly obsolete; petals about 11 mm. long, nearly clawed, cuneate dilated, retuse; smaller stamens 2, larger about 3.5 mm. long, the styles 5 mm. long, both ciliolate. Root vertical, rather stout.—The species name is for my friend who was director of the botanical institutions at Geneva during my sojourn there.

Lima: North of Chosica on stony outcrops with Cacti and other scattered plants, 1,000 meters, *Weberbauer 5342*, type.

Oxalis huantensis Knuth, Pflanzenreich IV. 130: 432. 1930.

Strigillose firm simple stems about 2 dm. high, 5–6 mm. thick below; petioles 4–10 cm. long, grayish tomentose puberulent, the stipules to 4 mm. long, the narrowly triangular free part only 1 mm. long; leaflets sessile, glabrate and opaque above, appressed gray-pubescent beneath and on the margins, oblong or broadly ovate-cuneate, to 2.5 cm. long, 1.5 cm. wide, with obtuse or rectangular sinus 2–2.5 mm. deep; peduncles 14–20 cm. long, puberulent, with a more or less bibranched 13–20-flowered umbel, the branches to 7 mm. long; bracts irregular or linear, acute, 4 mm. long; pedicels nearly filiform, glabrous, 7–10 mm. long; sepals narrowly lanceolate, acute, pale green, glabrous, 6–7 mm. long; petals brown-nerved, 15 mm. long, long-clawed, obovate; styles of long-styled flowers one and a half times longer than sepals, the larger stamens as long as sepals; stamens and styles puberulent.—Allied to *O. spiralis*, fide Knuth.

Ayacucho: Huanta, 3,200 meters, *Weberbauer 7519*, type.

Oxalis hypopilina Diels, Bot. Jahrb. 37: 424. 1906; 88.

Shrubby, the ultimate branches ligneous, 2 mm. thick, tomentose and densely leafy toward the tips, the leaves crowded but not rosulate; leaflets oblong or oblong-ovate, obtuse or more or less rounded each end, about 3 cm. long and half as broad, glabrous above with some small white spots, sericeous puberulent beneath; medial petiolule 5–8 mm. long; petioles 3 cm. long; peduncles nearly apical, 4–5.5 cm. long, tomentose puberulent as the pedicels (3 mm. long), bracts (1 mm. long, deciduous) and calyces; sepals lanceolate, acutish, 5–6 mm. long, the broadly spathulate yellow petals twice as long; short stamens glabrous, the longer as the styles pubescent, a little longer than the sepals, the black rounded or slightly depressed capsule scarcely as long.—Distinct in habit and indument from *O. Poeppigii* (Diels); about 1 meter high, the branches thick and densely scarred above by the numerous fallen petioles. F.M. Neg. 26323.

Amazonas: Tupen, Prov. Luya, stony outcrop, 1,100 meters, (*Weberbauer 4796*, type; 155).

Oxalis juninensis Knuth, Notizbl. Bot. Gart. Berlin 7: 305. 1919; 223.

Subterranean caudex stout, sometimes 1 cm. thick, subligneous, more or less forked at apex with branches extending about 1 cm. above the ground and densely clothed with petiolar remains; petioles to 2.25 cm. long, succulent, nearly glabrous or sparsely pilose; leaflets glaucous, paler beneath and also lacunose-cellulose, glabrous above, triangular, retuse or very obtusely incised to one-eighth, 3 mm. long and broad; peduncles 1 cm. long, filiform, 1–2-flowered; pedicels 2.5–3 mm. long, sparsely pilose; sepals foliaceous, the outer ovate-orbicular, 2 mm. long and broad, rounded at tip; petals to 8 mm. long, yellow.—Spelled by author, 223, *"iuninensis"*; cf. *O. megalorrhiza* and relatives. *O. androsacea* Knuth, 228, of Ecuador has leaflets pubescent both sides, tomentose acutish sepals 3–4 mm. long.

Junín: Tarma, open stony places, 300 meters, (*Weberbauer 2359*, type).

Oxalis juruensis Diels, Verh. Bot. Ver. Brandenb. 48: 173. 1907; 90.

More or less ligneous, to 1 meter high, with rather spreading puberulent densely leafy branches, the alternate estipulate petioles to 6 cm. long, medial petiolule 7–8 mm. long; leaflets ovate, paler

and minutely subsericeous beneath, sparsely pilose above, to 4.5 cm. long, 2.5 cm. wide; peduncles many, 7–9 cm. long, about one mm. thick, somewhat pubescent, with a bifurcate umbel of 2–5 flowers; bracts lanceolate, acute, 1–1.5 mm. long; pedicels nearly filiform, 5 mm. long, somewhat lanate; sepals ovate, obtuse, becoming lanceolate and acute, then to 6 mm. long, subsericeous; petals pale yellow, twice as long as sepals; stamens as styles hirsutulous; capsules glabrous or minutely glandular, ovoid, 10 mm. long, 5–6 mm. thick, with 3 seeds in a cell.—Var. *emarginata* Huber of Brazil has the leaflets rounded and emarginate. The Tarapoto collection is placed here from the similarity of the negatives; this may be an error but the specimen is certainly not *O. amazonica* ex char. or negative. However other species which perhaps are all phases of one include *O. microcarpa* Benth., 63, and *O. sepium* St. Hil., 64; the former from Colombia is said to extend to southern Ecuador and seems to be the same except for slightly smaller flowers and capsules; the latter, typically of Brazil, has violet flowers. F.M. Negs. 26327; 26290 (*Ule 6714*).

San Martín: Road to Tarapoto, *Ule 6714* (det. Knuth, *O. amazonica*). Brazil.

Oxalis latifolia HBK. Nov. Gen. & Sp. 5: 237. *pl. 467*. 1822; 273. *O. araucana* Reiche, Bot. Jahrb. 18: 302. 1894, at least as to Peru. *O. atroglandulosa* Knuth, Notizbl. Bot. Gart. Berlin 7: 311. 1919; 253. *Ionoxalis latifolia* (HBK.) Rose, Contr. U. S. Nat. Herb. 10: 113. 1906.

Bulbs attaining a dm. or so in diameter, the brown scales merely ciliate, many-nerved; plants in flower usually a dm. or 2 high, glabrous or the leaflets, petioles and peduncles sparsely ciliate-pilose; leaflets broadly deltoid, to about 4.5 cm. wide, 2 cm. long or little longer, often smaller, the broad sinus shallow, the divergent lobes more or less ovate; petioles slightly succulent, often 8–12 cm. long or even longer, the basal peduncles sometimes 2 dm. long terminating in a simple umbel of several to 17 pink or violet flowers, these 8–15 mm. long; bracts more or less abruptly and acutely acuminate, 1–3 mm. long; pedicels 1–2 cm. long; sepals oblong or nearly, 3.5–5 mm. long, acute, reddish or dark bicallose at tip; typically longer filaments ciliate and with a lateral tooth; styles glabrous.—With *O. violacea* L., 271, the basic species of a large group of forms centering in Mexico, and it is possible that all the Peruvian material is distinct or even divisible but the monographer has not made this clear. F.M. Negs.

26292 (*Gaudichaud*, det. Knuth, *O. araucana*); 29556 (*O. atroglandulosa*).

Lima: *Wilkes Exped.*, (*Seler 244; 261*, all fide Knuth). In rocks, San Gerónimo, *5889* (det. Knuth). Talus slope, north of Barranca, *Worth & Morrison* (det. Johnston, *O. atroglandulosa*). Lomas de Dona Maria, *Goodspeed Exped. 9252*. Amancaës, *Soukup 1799* (det. Leonard). Limestone slopes, Atocongo, *Pennell 14778* (det. Knuth, *O. araucana*). Mongomarca Mountain, *Weberbauer 5682* (type, *O. atroglandulosa*). Chancay, *Ruiz & Pavón* (det. Knuth, *O. atroglandulosa*). San Lorenzo, *Gaudichaud* (det. Knuth, *O. araucana*).—Huánuco: Near Acomayo, 2,100 meters, *Woytkowski 5*.—Apurímac: In cultivated fields, 2,500 meters, *Vargas 9778?*— Cuzco: Yucay, 3,000 meters, Valle del Urubamba, (*Herrera 1369*).—Arequipa: Rock slides, south of Chala, *Worth & Morrison 15676* (det. Johnston, *O. atroglandulosa*). To Mexico (Texas) and the West Indies.

Oxalis lomana Diels, Bot. Jahrb. 37: 426. 1906; 200.

Acaulescent, 4–5 cm. high, from a bulbous caudex 8 mm. thick, its many basal roots filiform; leaves rosulate, 10 or fewer, with sparsely pilose petioles 3–4 cm. long, the obcordate, obtusely incised leaflets to 9 mm. long and broad, opaque and a little pilose or glabrate above, paler and somewhat hirsute-arachnoid beneath; peduncles 2–4-flowered, densely pilose as the bracts (subulate, 4 mm. long), pedicels (4–8 mm. long) and sepals, these unequal, the larger ovate-deltoid, to 6.5 mm. long, 4 mm. wide, in fruit equaling the oblong 9 mm. long capsule; flowers yellow, 10 (–12) mm. long; stamens glabrous, the styles nearly so.—The petioles and peduncles are articulate about 1 cm. above the base which persists. The var. *hirsuta* Knuth, 200, is the typical form, more or less lanate including the sepals; in the var. *glabrescens* Knuth, l.c. these are glabrate. Among species with unequal sepals easily recognizable by the tuberiform rhizome, indument of leaves and inflorescence (Diels).

Arequipa: Lower edge of lomas, Mollendo, *Weberbauer 1480*, type; 144; *Johnston 3550; 6292* (both det. Knuth). Posco, Cachendo and Mejía, (*Günther & Bruns 256; 256a; 257*, all fide Bruns).—Tacna: Tacna, 800 meters, *Werdermann 726* (det. Knuth); *Woitschach 13; 15; 17* (these three var. *glabrescens*).

Oxalis lotoides HBK. Nov. Gen. & Sp. 5: 241. 1822; 138. *Acetosella lotoides* (HBK.) Kuntze, Rev. Gen. 1: 92. 1891.

Supported in shrubs or procumbent, sometimes 7 dm. long or longer, rather densely divaricately branched, foliate and floriferous

nearly from the base, herbaceous-subligneous, the greenish brown stems glabrous below, often 2.5 mm. thick, increasingly soft-pubescent from the middle to the tips; petioles 2–2.5 cm. long, the 3–9 mm. long stipules two-thirds adnate, acute; leaves often crowded, the leaflets all sessile, obcordate, mostly 15 mm. long, 12 mm. wide, one-eighth incised with obtuse sinus, appressed hirsute both sides and marginally; peduncles 3–6 cm. long with 2–9-flowered irregular cyme, the subulate acute bracts 4 mm. long, the pedicels (8–12 mm. in type) 0.5 to 4 cm. long; petals pale, violet-striate, obovate, 17–22 mm. long, the oblong-lanceolate acutish sepals 6 or 7 mm. long; styles pubescent (type).—Type from Colombia. *O. pichinchensis* Benth., 138, doubtfully distinct according to Knuth, and the same according to Weddell, has leaflets glabrate above as sepals, these 6.5–8 mm. long and obtuse or retuse. But my *4281*, which I refer with some doubt to *O. fruticetorum* and Knuth here, suggests that either the species of HBK. is too narrowly defined or is not in Peru; the Raimondi collection is not now at hand. Knuth describes stamens and styles glabrous, the former not noted by HBK. Illustrated, Hook. Icon., n. ser. 3 *pl. 661*. F.M. Negs. 36805; 26340 (*O. pichinchensis*).

Cajamarca: Montaña de Nancho, Hualgayoc, 2,500 meters, (*Raimondi*, det. Knuth). Colombia to Bolivia; Venezuela.

Oxalis lucumayensis Knuth, Repert. Sp. Nov. 23: 144. 1926; 135.

Procumbent-ascending, the nearly fleshy branches to 4 dm. long and (in herb.) 5 mm. thick, brownish-yellow tomentose as the leaves, especially beneath, and the entire plant in greater or less degree even to the irregular 8-flowered umbels, except for the yellowish petals that apparently are about twice as long as the 8 mm. long lanceolate somewhat hirsute sepals; leaflets all sessile, oblong, the lateral a little oblique at the rounded base, the medial somewhat cuneate, all bilobed with acute 5 mm. sinus, often 6 cm. long, 3.5 cm. wide; petioles to 9 cm. long, as often also the peduncles; bracts linear, as densely tomentose as the pedicels.—Imperfectly known.

Cuzco: Lucumayo Valley, 1,800–3,600 meters, *Cook & Gilbert 1351*, type.

Oxalis Macbridei Knuth, Pflanzenreich IV. 130: 431. 1930.

Suffruticose, glabrous, 6–10 dm. high, the ligneous stems to 5 mm. thick, subsimple, leafy especially above the middle; petioles to 8.5

cm. long, firm, purplish toward base; leaflets 3, the middle one lanceolate, cuneate at base, gradually acutely acuminate, 8–9 cm. long, 3–3.5 cm. wide, on firm petiolule 2.5 cm. long, the lateral subsessile, often 5.5 cm. long, 2.5–3 cm. wide, abruptly and very acutely acuminate; peduncles rather numerous, 6–8 cm. long, strict; bracts linear-lanceolate, acute, 3 mm. long; inflorescence with two branches, these with two forks, the former to 1 cm. long, the latter 2 cm. long with 1 or 2 flowers at tip and marked with pedicel-scars; sepals ovate, obtusish, finally dilated, 4 mm. long, the yellow petals 3 times longer; styles and stamens glabrous.—Nearest, fide the author, to *O. Tessmannii*. Bush to 1 meter high with canary yellow flowers said to cause irritating skin eruption (Mexia).

Huánuco: Pampayacu, 1,100 meters, *5089*, type. Along Río Huallaga to Riachuela Chontalagua, *Mexia 8295a* (det. Standley).

Oxalis marcapatensis Knuth, Repert. Sp. Nov. 29: 216. 1931.

Glabrous; rhizome deeply set, perpendicular, 4 mm. thick, erect, closely scaly from petiole or stipule rudiments, topped apically by rosette 7 cm. across of about 8 peduncles and many leaves, the former mostly 2–3-flowered, as long as petioles, the latter with sessile obovate leaflets 10 mm. long, 6 mm. wide, about 1 mm. notched at apex; petioles 5 cm. long, fleshy, dilated, articulate 2 mm. above base; free part of stipules acute, lanceolate, 3 mm. long; bracts 2 mm. long, linear, acute, often reddish; pedicels 1–2 cm. long, filiform; sepals lanceolate, acute, without callus, 6.5 mm. long the larger stamens as long, sparsely ciliate; corolla tubiform, the petals orange-yellow veined with red, retuse, about 15 mm. long.—Section *Carnosae*, affine *O. paucartambensis* (Knuth), and apparently not distinguishable.

Cuzco: On rocks, 2,500 meters, Marcapata Valley, at Chilechile, (*Weberbauer 7870*, type).

Oxalis Martiana Zucc. Denkschr. Akad. Muench. 9: 144. 1823–24; 250.

Acaulescent, often 2 dm. high or taller, from a rotund bulb 2–2.5 cm. in diameter composed of many brown bulblets about 4 mm. thick; leaves often many, rosulate, on lax petioles to 2.5 dm. long that are sparsely hirsute with a few long spreading trichomes and a small fascicle of trichomes at the insertion of the rotund-obcordate leaflets, these glabrous, minutely callosed marginally, 2.5–3.5 cm. long and broad, lightly but often acutely incised;

peduncles few (1–5), often 1.5 dm. long, 5–12-flowered, glabrous as the pedicels and calyces or somewhat hirsute; bracts several, 2 mm. long, ecallose; pedicels irregularly umbellulate, 1–4 mm. long; sepals ovate-lanceolate, reddish-callose at acutish tip, 5–7 mm. long; corolla conic-campanulate, 3–4 times longer than calyx, blue-violet, paler toward base, the cuneate-obovate petals rounded-retuse, entire; larger stamens longer than sepals.—The similar *O. bulbifera* Knuth, 252, and *O. limosa* Prog., 251, of Brazil, the former from Bolivia, are unique (according to the monographer) in having many stolons from the elongate bulb, these bearing apically bulblets; the last has a very irregular umbel, that of the first being regular. Illustrated, Bot. Mag., *pls. 2781; 3896*. F.M. Neg. 19199.

San Martín: Near Moyobamba, *Klug 3593* (det. Standley). Lima: *Soukup 1916* (det. Leonard). San Gerónimo, ditch bank, *5888* (det. Knuth). Brazil; Bolivia; Argentina; and widely established in warmer regions.

Oxalis Mathewsii Knuth, Pflanzenreich IV. 130: 87. 1930. *O. tumbezensis* Knuth, l.c. 431.

Shrub densely fuscous tomentose even to the umbels, the short branches 3–4 mm. thick; petioles to 9 cm. long, the lateral petiolules 2–3 mm. long, the medial to 13 mm. long or longer; leaflets all ovate-lanceolate, cuneate to base and acute apex, the medial often 5 (–7.5) cm. long, half as wide, the lateral 4–5 cm. long or smaller; peduncles to 6 cm. long, many as the leaves toward the branchlet tips, the pseudo-umbellate flowers scarcely or shortly dichotomous; pedicels 1.5–4 (10) mm. long; sepals oblong, obtuse, 6–8 mm. long, the yellow cuneate-obovate or -oblong petals 10–12 mm. long; larger stamens as long as sepals, subglabrous, the smaller two times shorter; styles hirsutulous or rarely glabrous, as long as or longer than sepals.—The second species of Knuth seems to be only a robust plant, slightly larger in all parts; the species is apparently very near to *O. psoraleoides* HBK., 87, of Colombia and *O. piauhyensis* Knuth, 94, both earlier names. F.M. Neg. 26333.

Tumbez: Hacienda Chicama, 800 meters, *Weberbauer 7639* (type, *O. tumbezensis*).—Cajamarca: Near Jaén, *Weberbauer 6196* (det. Knuth, *O. sublignosa*); also *Raimondi 2229; 4740* (det. Knuth, *O. piauhyensis*).—Amazonas: Chachapoyas, *Mathews*, type, Herb. Delessert.—Cuzco: Echarate, Prov. Convención, *Goodspeed Exped. 10515*. Hacienda Santa Rosa, Prov. Convención, *Soukup 799*. Hacienda Potrero, 1,300 meters, Prov. Convención, *Vargas 2487*.

Oxalis medicaginea HBK. Nov. Gen. & Sp. 5: 242. 1822; 136. *Acetosella medicaginea* (HBK.) Kuntze, Rev. Gen. 1: 92. 1891.

Glabrous and procumbent below but the younger ascending branchlets pubescent probably several dm. long; petioles nearly glabrous, 2–2.5 cm. long; stipules membranous, adnate below the tips free, pilose; leaflets subsessile, obovate, emarginate, reticulate, ciliate, glabrous above, appressed pubescent and subglaucous beneath, the lateral 14–15 mm. long, the medial 16 mm. long, 12 mm. wide; peduncles filiform glabrous, bifid apically, 4–12-flowered, a dm. long or longer, much exceeding the leaves; flowers becoming racemose, about 2 cm. long, on filiform pubescent pedicels 6–10 mm. long, articulate above the base; bracts linear, acuminate, puberulent; sepals glabrous, oblong-lanceolate, obtuse, a half as long as the corolla; petals rounded or emarginate; filaments glabrous; styles pubescent.—After HBK. Progel describes the longer filaments as with a lateral tooth; Knuth found the filaments and styles hirsute, the sepals pubescent, acute, to 7.5 mm. long. From the negative the stems appear to be subligneous. It is noteworthy that the origin of the type was not surely known. If Knuth's characterization is correct the name seems to be the earliest for a number of forms. F.M. Neg. 36808.

Peru: Possibly; according to Knuth Colombia and Venezuela to Argentina in the Andes but not in Peru.

Oxalis megalorrhiza Jacq. Oxal. 33. 1794; 184. *O. carnosa* Molina, Sagg. Nat. Chile ed. 2. 288. 1810. *Acetosella megalorhiza* (Jacq.) Kuntze, Rev. Gen. 1: 92. 1891.

Plant 4–10 cm. high, glabrous (except a var.), from a subligneous-fleshy horizontal rhizome even to 2 cm. thick, the similar and erect simple or little forked stem scaly above with scars of fallen petioles, leafy and floriferous only at the tip; petioles to 8 cm. long; leaflets glaucous-green, slightly lustrous above and papillose beneath, obcordate, 1–1.5 cm. long, mostly 12 mm. long and broad, lightly incised; peduncles to 10 cm. long, the umbel 2–5-flowered with narrowly linear bracts; outer sepals broadly ovate, nearly hastate at base, acutish, 7 mm. long, 4 mm. wide, the inner narrower, suboblong, and almost hidden by the outer; corolla yellow or orange, 18 mm. broad, the marginate petals broadly connate at base, three to four times longer than the calyx; seeds many in each cell.—The var. **hirta** (Knuth) Macbr. comb. nov., *O. carnosa* Mol. var. *hirta* Knuth, Pflanzenreich IV. 130: 186. 1930, has the leaves hirsute

beneath. Biology discussed by Hildebrand, Lebensverh. Oxal. 9. 1884. Knuth cites the type of Jacquin as definitely the same as the plant of Molina but the latter's name may be in the first edition of his work, 1782, and thus earlier. The type number of *O. arequipensis* at Chicago was determined by Knuth as *O. carnosa!* I have placed it with *O. solarensis*, doubtless merely a variety with smaller obtuse or rounded sepals.—Illustrated, Bot. Mag. *pl. 2866;* Bot. Jahrb. 18: *pl. 9;* Knuth, l.c. *fig. 14*, page 185.

Determinations by Knuth except as noted.

Ancash: In sand among loma boulders, Casma to Huarmei, *Goodspeed Exped. 9162* (det. Johnston).—Lima: near Lima, *Rose 18575.* San Gerónimo, *5986.* San Gallen and Viejas Islands, (*Murphy 3469; 3218*, det. Johnston). Chorillos, *5853; 5852.* Amancaës, *Soukup, 2139; 1798* (det. Leonard); *Mexia 04012* (det. Johnston, typica). Rocky slopes near Barranca, *Worth & Morrison 9118;* (*9108*) (both det. Johnston). Prov. Huarochirí, *Goodspeed & Metcalf 30245* (det. Johnston). Atocongo, *Pennell 14769.* Chosica, *2871.* Rock crevice, Huariaca, *3106.* Rock outcrops and loose soils, Matucana, *167; 2918; 2956.* Río Blanco, rock outcrops, 3,000 meters, *2973; Killip & Smith 21538.* Tacna, (*Woitschach*). Galapagos; Chile; Bolivia.

Oxalis melilotoides Zucc. Denkschr. Akad. Muench. 9: 165. 1823–24; 109. *O. Haenkeana* Spreng. Syst. 4, pt. 2: 186. 1827. *Acetosella melilotoides* (Zucc.) Kuntze, Rev. Gen. 1: 92. 1891.

Glabrous (or nearly except cilia) greenish-red little branched herb 6–10 dm. high, probably trailing; leaves remote, the leaflets sessile or nearly, cuneate-obovate, emarginate or lightly obcordate, pale green above, glaucescent beneath, the midnerve often callus-tipped, about 2.5 cm. long, 13–17 mm. wide; petioles to 5 cm. long; stipules adnate, the younger finely ciliate; peduncles nearly twice longer than the leaves, bifid at apex, to 15-flowered, the laxly racemose flowers secund on filiform erect pedicels 2.5 cm. long, finally spreading-refracting; sepals lanceolate, acute, as the bracts but these a little ciliate; corolla ample, infundibuliform, the yellow red-striped petals obovate; larger filaments and styles finely barbate; ovary 5-angled, glabrous, the capsules ovoid. Flowers 15 mm. long or longer.—The type locality may be a misreading of "Huánuco." The Stork & Horton plant was prostrate or pendent, about 1 meter long, calyx stems and leaves beneath purple as also Woytkowski's, this with red-orange flowers! F.M. Neg. 19200.

Huánuco: Fog belt forest, Carpish, *Stork & Horton 9926*. Without locality, probably dept. Huánuco, *Haenke*, type. Sariapampa, open glade, 3,200 meters, *Woytkowski 34291*.—Junín: Carpapata above Huacapistana, 2,700 meters, *Killip & Smith 24468* (det. Knuth, *O. tuberosa*).

Oxalis micrantha Bert. ex Colla, Mem. Accad. Torino 37: 50. 1834; 121. *Acetosella micrantha* (Bert.) Kuntze, Rev. Gen. 1: 92. 1891. *O. chosicensis* Knuth, Notizbl. Bot. Gart. Berlin 7: 303. 1919; 125.

Small usually more or less tufted annual ordinarily only a few cm. tall, in varying degree hirsute and somewhat glandular, especially the nearly filiform divaricate pedicels (these to about a cm. long) of the laxly branched several to many-flowered cymes; petioles to 8 cm. long, about half as long as the peduncles, the broadly obcordate rather deeply emarginate leaflets sometimes 14 mm. long, 15 mm. wide, often smaller; bracts caducous, 1–2 mm. long; sepals often rubescent below and marginally, nearly linear, acute, 3–4 mm. long, sometimes equaled by the spathulate yellow petals; seeds 1–many in each cell.—The form designated var. *setifera* Knuth is more densely and more harshly pubescent. F.M. Neg. 26335.

Lima: Loma Ancón, 700 meters, *Soukup 2127*. On stony outcrops north of Chosica, *Weberbauer 5347* (type, *O. chosicensis*). Saldacuna, *Soukup 1939* (det. Leonard).—Arequipa: North of Atiquipa, *Worth & Morrison 15655*. Mejía and Posco, (*Günther & Buchtien 253*, det. Bruns). Moquehua: Open mixed formation, 2,200 meters, Torata, *Weberbauer 7393* (det. Knuth). Chile; Argentina.

Oxalis minima R. & P. ex G. Don, Gen. Syst. 1: 760. 1831. *O. Ruizii* Knuth, Pflanzenreich IV. 130: 248. 1930. *O. Philippii* Knuth, Meded. Rijks Herb. Leiden 27: 67. 1915, probably, at least as to Peru.

Bulb about a cm. in diameter, the brown scales fibrous lanate in age; peduncles and petioles subequal or the former in type shorter (maybe this is a diminutive form), a cm. or so long, sometimes 5 cm. high, the 2 bracts early below the calyx as to type, finally about medial apparently as the peduncle lengthens; petioles glabrous, 2.5–4 cm. long, more or less margined especially toward the base; leaflets obcordate, 4–6 mm. long, 5–8 mm. wide, somewhat shorter, often a little larger; sepals 3–5 mm. long, rather more obtuse than acute, oblongish, ecallose but sometimes slightly ciliate toward tip

and reddish on the thinner margins; petals pink or white but more or less tinted in part, usually 12–15 mm. long; stamens puberulent, so far as observed.—Leaflets described as pubescent both sides under a lens by Exell, Journ. Bot. 63: 174. 1925, on whose description of type, Herb. Lambert, I have drawn, but this may refer to the lacunose condition, especially beneath. The name of Ruiz & Pavón is to be retained as its first valid use in the genus. The species, at least sens. lat., is apparently under various names in all the high Andes. F.M. Neg. 29560 (det. Knuth, *O. Philippii*).

Lima: Río Blanco, *3018* (det. Knuth, *O. Asplundii*). Hacienda Arapa near Yauli, (*Weberbauer 307; 346*, both det. Knuth, *O. Philippii*); 221.—Junín: Cerro de Pasco, (*Raimondi*, det. Knuth, *O. Philippii*). La Oroya, *Kalenborn 25*.—Libertad: Grassy slopes of glacial valley, Cerro Huaylillas, Prov. Huamachucho, 3,800 meters, *West 8118* (det. Johnston, *O. oreocharis*). Huancavelica: Puna grass slopes, 3,900 meters, *Stork & Horton 10840* (det. Standley, *O. Asplundii*). Without data, Herb. Madrid, *Ruiz & Pavón*, type.

Oxalis modestior Knuth, Repert. Sp. Nov. 40: 293. 1936.

Trunk fleshy-subligneous, 5 cm. high or higher, 5 mm. thick, simple in the only one seen, scaly by the remains of leaves and bearing many leaves and peduncles at the tip, both of these (as to type) glabrous, the former with filiform petioles 2–3 cm. long, the latter also filiform but one and a half times longer with an apical umbel of 3–5 flowers on pedicels 5–8 mm. long; stipules lanceolate, acute, hispidulous, to 5 mm. long; leaflets rotund-obcordate, broadly cuneate or nearly rounded at base, rounded or lightly rounded-excised at tip, 3–4 mm. long and broad, in type glabrous and glaucous; bracts linear, acute, hirsutulous, 2–3 mm. long; sepals narrowly lanceolate, 4–5 mm. long, 1.5 mm. wide, retuse at the often reddish tip, glabrous; petals 10–12 mm. long, unguiculate-cuneate from base, rounded at apex, apparently whitish, the veins purple; stamens in type puberulent longer than the larger sepals.—Section *Carnosae*, but could be a diminutive state of *O. peduncularis;* neither the West nor the Stork and Horton specimens exactly agree with type, the former with a *megalorrhiza* type caudex-root, the latter with leaflets pilose beneath.

Cuzco: Saxaihuamán, 3,200 meters, *Herrera 3121*, type. Ruins of Tambomachay, Saxaihuamán, 3,600 meters, *West 3856* (det. Johnston with query *O. megalorrhiza*).—Libertad: rock crevices, Huamachuco, 3,300 meters, *West 8093*.—Huancavelica: Gravelly

clay north of Pampas, 3,250 meters, *Stork & Horton 10239* (det. Standley, *O. pygmaea* Gray). "Chchahulco" (West).

Oxalis mollis HBK. Nov. Gen. & Sp. 5: 241. 1822; 137. *Acetosella mollis* (HBK.) Kuntze, Rev. Gen. 1: 92. 1891.

More or less densely villous unless above where puberulent-tomentose, the stems somewhat ligneous and apparently several dm. long, sparsely branched and rather densely leafy toward the tips; leaflets sessile, obovate-obcordate, broadly cuneate at base, to 2 cm. long, 17 mm. wide (16–18 by 12–14, type), to one-sixth incised with obtuse sinus, the broad rounded lobes straight, appressed pilose above, rather appressed lanate beneath; petioles 1.5–4 cm. long with stipules membranous villous adnate or tips about 2 mm. long; peduncles about 7 cm. long, lax, slender with a 7–10-flowered cyme, its branches sometimes 1.5 cm. long, the pedicels 1–14 mm. long; bracts subulate, acute, to 3.5 mm. long; sepals lanceolate, acutely acuminate, 4 mm. long, finally 7 mm. long (Knuth), more or less sericeous-villous, the whitish petals apparently about twice as long; longer stamens and styles pubescent.—Knuth suggests very probably a form of *O. lotoides* HBK., 138. The Colombian type at Paris is a young plant, the sepals thus short, petals not developed. *O. mollissima* (Rusby) Knuth, 137, of Bolivia, has densely tomentose villous leaflets 3.5–4.5 cm. long, 2.5–4 cm. wide. The var. *glandulosa* Knuth, 433, the Peruvian plant, may not belong here; it has broadly cymose inflorescence, densely and minutely glandular. F.M. Neg. 36810.

Huánuco: Muña, *4311*. Huacachi near Muña, *4091*. Colombia; Bolivia (Knuth).

Oxalis moqueguensis Knuth, Pflanzenreich IV. 130: 438. 1930.

Bulb scales narrow, ribbed, somewhat lanate, acuminate; leaves 1–5, the leaflets glabrous but more or less callus dotted marginally, broadly triangular, to 2 cm. wide, 1.25 cm. long, emarginate somewhat rectangulately, petioles slender, 7–14 cm. long, the few peduncles slightly to about twice as long, terminating in an umbel of 2–5 (rarely only 1) flowers, their pedicels often 3 cm. long or longer, pendent in fruit; bracts variable in form, about 2 mm. long; sepals lanceolate, acute or obtusish, 7–9 mm. long, with 2 or 3 dark linear calli at tip; flowers purple or rose-colored, sometimes changing white, 17–20 mm. long; stamens and styles glabrous, the longer stamens equaling or finally longer than the sepals.—Pods linear-cylindric,

nearly 2 cm. long, at maturity pendent. Seems to be near *O. pazensis* (Rusby) Knuth, 259, not seen and may be a local variant of *O. elegans*.

Moquehua: Rainy green formation, 3,100 meters, Carumas, *Weberbauer 7255*, type; also *7309*.

Oxalis nubigena Walp. Nov. Act. Acad. Leop.-Carol. 19: Suppl. 1: 320. 1843; 218. *O. pygmaea* Gray in U. S. Expl. Exped. Bot. 1: 322. 1854. *O. aetheria* Macbr. Candollea 6: 8. 1934 (*O. pygmaea* Gray, not Meyer). *O. yauliensis* Knuth, Repert. Sp. Nov. 24: 51. 1927.

A few cm. high (with stem) and more or less compact, or sometimes a globular little annual, the stem obsolete or very short and concealed completely in the many crowded leaves and peduncles, the former 1–3 cm. long with conspicuous scarious stipules a third to a half as long and soon lacerate at tip, the latter shorter or longer, 1-flowered, with a pair of caducous subulate linear or filiform submedial bracts varying from 1–2 to several mm. long; leaflets broadly obcordate, glabrous or early with a few marginal cilia, almost minute to 7 mm. wide, 5 mm. long, usually somewhat smaller, obviously but moderately retuse; flowers white or probably always with yellow centers, small, about 3 mm. long or in type said to be 3.5–4 mm. long, the sepals described as ovate-lanceolate but for plants seen linear-lanceolate, acutish, membranous, 2–2.5 mm. long, slightly longer in age; capsules short, subovoid, with about 8 seeds or usually 2 in each cell.—Without the type this interpretation may be incorrect but the careful Weddell, Chlor. And. 2: 291. 1857, wrote of *O. pygmaea:* "flowers yellow; otherwise character of *O. nubigena.*" However *Pennell 13766* (det. Knuth, *O. pygmaea*) was proximally yellow and my *918* had a yellow tube. This seems to be a starved plant; half covered with snow when found, it was (naturally?) reduced and rubescent.

Lima: On limestone rocks, Pucará, 3,700 meters, *Weberbauer 437* (det. Knuth). Baños and below Culnai (Cullnay), *Wilkes Exped.* (type, *O. pygmaea*). Río Blanco, stony barren hillsides, *2971* (det. Knuth, *O. pygmaea*). Alpamina, *Weberbauer 5124* (det. Knuth).—Junín: Yauli, 4,200 meters, rock ledges, *918* (type, *O. yauliensis*). On porphyric rocks, 4,400 meters, (*Weberbauer 303*, det. Knuth).—Cuzco: Bushy banks, Colquipata, 3,500 meters, *Pennell 13766* (det. Knuth, *O. pygmaea*). Hacienda Churú, Valle de Paucartambo, 3,500 meters, *Herrera 1043a; 1907b; 1912* (all det. Knuth, *O. pygmaea*). Asunción Bridge, among mosses, 3,750 meters, *Vargas*

11027 (det. Standley, *O. ollantaytambensis*).—Puno: Chiquibambilla, puna streamlet bank, 3,900 meters, *Pennell 13394* (det. Knuth, *O. pygmaea*). Compuerto, (*Weddell*). Lake Titicaca, (*Meyen*, type). Bolivia; Argentina(?); Chile(?).

Oxalis oreocharis Diels, Bot. Jahrb. 37: 423. 1906; 246. *O. Asplundii* Knuth, Repert. Sp. Nov. 24: 53. 1927, at least as to Peru.

Acaulescent, 3–7 cm. high from a rotund bulb 12 mm. in diameter or smaller, densely squamose with lanceolate scales about 6 mm. long; stipules membranous, long-pilose, 6–8 mm. long; petioles 2–6 cm. long, lax, glabrous; leaflets glabrous or sparsely pilose, softly long-ciliate, ovately obcordate, about 8 mm. long and 9–12 mm. broad, glaucous-green, cellulose-lacunose both sides, the lower surface often completely dark punctate-striate; peduncles only 1–6, 1–4 cm. long in type, about as long as petioles, 1-flowered, glabrous as the sepals, bibracteolate 5–10 mm. below the tip, the abruptly acuminate nearly mucronate bractlets (2) 3–6 mm. long, connate basally; flowers broadly conical, rose-colored, (15) 13–18 mm. long, the sepals 5–7 (4–4.5) mm. long, oblong, truncate or retuse, bicallose at tip, the petals broadly cuneate, retuse, rounded, entire; longer stamens very sparsely ciliate or glabrous longer than sepals, the styles pilose below.—Knuth distinguishes his plant, type from Bolivia, Tuapata, *Watkins* (det. Knuth, *O. Asplundii*), by wide petioles appearing alate in herb, leaflets sparsely ciliate, sepals lanceolate, membranous, acute, the calli scarlet slender lines, differences if specific not apparent in our material. For that matter the significance of the characters I have been forced to use in key without general reduction are unknown to me, and here too, type or material cited by Knuth not seen.

Lima: Bunch grass slope, Río Blanco, 3,000 meters, (det. Knuth, *O. Asplundii*).—Junín: East of Palca on grass steppes with scattered shrubs, Huarochirí, 3,000 meters, *Hrdlicka* (det. *O. Asplundii*, by Knuth); 3,500 meters, (*Weberbauer 2493*, type); 94; 223; 249. La Oroya, among polster and rosette plants, 4,300 meters, (*Weberbauer 2625*, fide Diels).

Oxalis Ortgiesii Regel, Gartenflora 24: 1. 1875; Act. Hort. Petrop. 3: 117. 1875; 110. *O. excisa* Prog. in Mart. Fl. Bras. 12, pt. 2: 496. 1877. *Acetosella Ortgiesii* (Regel) Kuntze, Rev. Gen. 1: 92. 1891. *A. excisa* (Prog.) Kuntze, l.c. *O. Raimondii* Knuth, Pflanzenreich IV. 130: 111. 1930.

Becoming a dm. to several dm. high, rooting along the decumbent base in age and the fibrous roots with an occasional small perhaps abortive tuber, the stems more or less densely strigillose especially toward the leafy tips, in age even 4–5 mm. thick; petioles slender, 2–8 cm. long; leaflets obscurely to rather densely appressed pubescent especially beneath, thinly membranous in herb., subequal but only the lateral strongly oblique, the somewhat larger medial broadly obtriquetrous in younger plants, about 2.5 cm. wide at apex, 1.5 cm. long, in older or vigorous plants about three times larger, variously subtruncate to lunate and subacute to rounded at the upper angles; peduncles somewhat longer than the leaves, the short cyme subumbellate, 2–10-flowered, the branches becoming 1 cm. long and often nodosely scarred; bracts caducous; sepals linear-lanceolate, glabrous or nearly, acute, 5–6 mm. long; petals yellow, about 10 mm. long; filaments and styles puberulent, papillose or apparently sometimes glabrous (*O. Raimondii*, which, in Knuth's key, l.c. 107, is written *Raymondii*).—In view of the use of the presence or absence of pubescence on the filaments as a taxonomic character I may err in drawing this diagnosis to include Knuth's segregate (seemingly younger plants) but there appears to be no concomitance between size of leaves, shape of leaflets and filament-character. General revision in this subgroup as elsewhere is needed. Illustrated, Bailey, Stand. Cycl. Hort. 4: *fig. 2687*. F.M. Neg. 32453.

San Martín: Tarapoto, *Spruce 3999*. Zepelacio, *Klug 3555; 3383*. Pongo de Cainarachi, *Klug 2683*. Yera, *Woytkowski 35306*.—Huánuco: By Tocache in dark woods, *Poeppig* (type, *O. excisa*). Río Chinchao Valley, wooded slopes, *5024; Stork & Horton 9860*. Tingo Maria, *Stork & Horton 9467*. Cushi, *4834* (det. Knuth, *O. Raimondii*). Muña, *4046* (det. Knuth, *O. Raimondii*).—Junín: Oxapampa, *Soukup 2400*. Río Paucartambo Valley, *Killip & Smith 25356*, San José to Cueva de la Achira, *Raimondi;* also, shores Huallaga, *Raimondi* (type, *O. Raimondii*).—Ayacucho: Huanta to Río Apurímac, *Killip & Smith 22352*.—Cuzco: Valle Lares, *Diehl 2503?*

Oxalis pachyrrhiza Wedd. Chlor. And. 2: 290. 1857; 231.

Low, acaulescent, subcespitose from a thick fleshy more or less elongate caudex that is ebulbate but imbricate-scaly with lanceolate ciliate petiolar remains; petioles elongate, dilated at base and connate with ciliate stipules; leaflets obcordate, 5–12 mm. long and broad, shortly petiolulate, sparsely hirtellous only at base; peduncles

tribracteate above the middle, with ciliate bracts; sepals ovate, obtuse, glabrous, 4–5 mm. long; corolla apparently yellow.

Puno: Near La Compuerta, on the way from Puno to Arequipa, 400 meters, (*Weddell*, type). Argentina.

Oxalis parvifolia DC. Prodr. 1: 693. 1824; 166. *O. microphylla* HBK. Nov. Gen. & Sp. 5: 245. 1822(?), not Poir, 1816. *O. hirtella* Willd. ex Zucc. Denkschr. Akad. Muench. 9: 160. 1823–24, not Jacq. 1794. *Acetosella parvifolia* (DC.) Kuntze, Rev. Gen. 1: 93. 1891. *O. rufescens* Turcz. Bull. Soc. Nat. Mosc. 31. 1: 429. 1858, at least as to Peru.

Herb with vertical root, the many procumbent stems 1–2.5 dm. long, 1–1.5 mm. thick, sometimes subligneous, bearing verticels of 2–7 leaves and a few peduncles at rather closely spaced nodes; leaflets obcordate, about 5 mm. long and broad or broader, or often smaller, rather deeply incised, more or less hirsute beneath or at least marginally, glabrate above; petioles 1–2 cm. long or longer; stipules adnate; peduncles 1-flowered, said typically to exceed 1 cm. (with pedicel), medially with two linear or setaceous hirsute bracts 2–3 mm. long; sepals oblong or rather ovate, obtuse, pilose, 3–4 mm. long, the somewhat longer yellow corolla infundibuliform, the petals slightly retuse; stamens pilose, the trichomes of the styles said to be spreading-erect; seeds 3–6(?).—*O. filiformis* HBK., 169, seems to be the same. F.M. Neg. 36809.

Lima: Dooryard weed, *3039;* upland slope, *806* (both det. Knuth). Yauli, *Stork & Horton 10874.*—Junín: Huancayo, *Soukup 1894.* La Oroya, gravelly places, *Kalenborn 87.*—Cuzco: *Watkins* (det. Knuth, *O. rufescens*).—Puno: Streamlet bank on puna, 3,800 meters, Chuquibambilla, *Pennell 13399.* Colombia to Chile and Uruguay.

Oxalis paucartambensis Knuth, Pflanzenreich IV. 130: 187. 1930. *O. Ledigii* Knuth, Repert. Sp. Nov. 40: 292. 1936.

Glabrous except for a few long soft trichomes on the obovate-cordate leaflets, a slight pubescence on the 2 mm. long subulate very acute bracts and often a line of cilia on the lanceolate acute 3–6 mm. long stipules; stems succulent, in type 3–4 mm. thick, 7 cm. high, leafy toward the tip and with 1–5 peduncles, these 4–15 cm. long or longer terminating in a few-flowered shortly or obscurely branched cyme; pedicels 5–10 mm. long, slender; leaflets to 13 mm. long, 9–13 mm. wide, acute with somewhat rectangular acute sinus 1.5–2 mm. deep, its lobes rounded; sepals 7.5–8 mm. long, 2 mm.

wide, pale green, often purple margined, narrowly lanceolate, acute; petals 15 mm. long, reddish without, yellowish within, cuneate from clawed base, lightly erose at retuse apex; stamens and styles puberulent.—Stems sometimes 3 dm. tall. The Río Blanco plant is nearly *O. peduncularis*.

Lima: Rock slides, Huaros, *Pennell 14712*. Río Blanco, *Killip & Smith 21565* (det. Knuth); my *2972* (det. Knuth, *O. peduncularis*).—Junín: Acopolco Cañon, Huancayo, 3,700 meters, *Ledig 53* (type, *O. Ledigii*).—Apurímac: Prov. Canas, *Vargas 11045*.—Cuzco: Hacienda Churú, Paucartambo Valley, 3,500 meters, *Herrera 1390*, type. Acomayo, 3,700 meters, *Vargas 206* (slightly more pubescent). "Occa-occa."

Oxalis peduncularis HBK. Nov. Gen. & Sp. 5: 239. 1822; 188. *Acetosella peduncularis* (HBK.) Kuntze, Rev. Gen. 1: 93. 1891.

Somewhat pubescent perennial to 5 dm. tall in flower, the fleshy, rarely ligneous, glabrous stems 5–7 mm. thick, erect or ascending, simple, to 2.5 dm. high, more densely foliate apically than below; leaflets about equal, sessile, obovate, lightly incised, to 12 mm. long, 9 mm. wide, glabrous above, little paler but appressed pubescent beneath and marginally (or glabrous), rather fleshy, green; petioles 4.5–6 cm. long with free lanceolate pilose stipules 2 mm. long; peduncles to 3 dm. long, erect, usually pubescent above with a contracted or biforked cyme of 9–16 flowers, the cyme branches sometimes 3 cm. long; bracts linear-subulate, acute, pubescent, 1.5–2.5 mm. long; pedicels 2–10 mm. long, filiform, pubescent; sepals lanceolate-ovate, acuminate, 4–5 mm. long, glabrous or nearly, often purple-margined, the narrowly cuneate red-striate yellow petals to 13 mm. long; stamens puberulent; styles glabrous.—Determinations by Knuth except as noted; type, Quito. Apparently it becomes ligneous, especially in Huancavelica, and then simulates *O. Herrerae*. F.M. Neg. 35682.

At Mito it was distilled in water and vinegar for coughs.

Lima: Mossy rocky slope, *431*.—Junín: Open hillside, Tarma, *Killip & Smith 21813*. La Oroya, *Kalenborn 90* (det. Knuth, *O. pubescens*). Carpapata, 2,400 meters, *Killip & Smith 24343*.—Huánuco: Loose sunny soils, Mito, *1581*. Near Pozuzo, rocky clay banks, *4799*. Sunny rocky banks, Chaglla, *3649*. Red clay slopes, Maria del Vallé, *3553* (det. Knuth, *O. Herrerae*).—Huancavelica: Clay bank, Salcabamba, 3,250 meters, *Stork & Horton 10267*. Near Surucubamba, *Stork & Horton 10344*.—Apurímac: Clay-gravel banks,

Prov. Abancay, 2,200 meters, *Goodspeed Exped. 10567* (det. Standley, *O. melilotoides*). Rock crevices, Chincheros to Andahuaylas, *West 3721* (det. Johnston, *O. crenata*).—Cuzco: Apurímac Valley, *Herrera 3077*. Urubamba Valley, *Herrera 3452*. Calca, *Vargas 3138* (det. Standley, *O. tuberosa*). Paucartambo Valley, *Herrera 1467*. Yucay, *Soukup 763*. Ecuador. "Chchulcu," "chullco-chullco," "chulco."

Oxalis peruviana Norlind, Arkiv. Bot. 20A, pt. 4: 5. 1926; 48. *O. fruticosa* Knuth, Notizbl. Bot. Gart. Berlin 7: 297. 1919, not Raddi.

Procumbent or ascending shrub with very irregular branching stems several dm. long, glabrous below, puberulent-viscous above, the subsimple branches densely leafy apically, often naked below, the petioles more or less persisting, these nearly filiform, 11–13 mm. long; leaflets petiolate, glaucous, minutely glandular-viscous, the medial reniform-rotund, 3–4 mm. wide, 2–3 mm. long; peduncles about erect, 1–3-flowered, to 3.5 cm. long, densely linear-bracted above; pedicels 1–2 mm. long; flowers to 7 mm. long, the sepals lanceolate, acute, somewhat viscous puberulent, about 3.5 mm. long; petals spathulate from clawed base, rounded, yellow; stamens and styles glabrous, the larger stamens shorter than the sepals.—Perhaps most nearly related to the Brazilian *O. saxatilis* St. Hil., 70, with slightly larger glabrous leaflets.

Ayacucho: Río de Lomas near Hacienda Pampa in sparse vegetation among scattered rocks, 1,000 meters, *Weberbauer 5746*, type.

Oxalis pes-caprae L. Sp. Pl. 434. 1753; 297. *O. cernua* Thunb. Diss. Oxal. 14. 1781.

Acaulescent 1.5–3 dm. high from a subsimple root 3 mm. thick; petioles to 13 cm. long, glabrous or glabrate, often 10 or 12 together, the cuneate-obcordate leaflets little paler beneath but long-ciliate and pilose, to 2 cm. long, 3 cm. wide or wider; peduncles 1–3 dm. long, more or less pilose, 3–8-flowered, erect or ascending; bracts many, narrowly linear, acute, pilose, 1–4 mm. long; pedicels 1–2 cm. long, as the calyces somewhat pubescent; sepals oblong-lanceolate, acutish, 5–7 mm. long; corolla about 22 mm. long, finally campanulate, yellow, the narrowly cuneate petals retuse; smaller stamens as long as sepals.—Knuth himself uses the name "pes-caprae," l.c. page 36; name without hyphen originally. Illustrated, Jacq. Oxal. *pl. 6;* Lodd. Bot. Cab. 12: *pl. 1154*.

Junín: La Oroya, *Kalenborn 180*.—Tacna: *Woitschach 106*. Africa; widely escaped or established elsewhere. "Foot-of-Goat" or "goat-foot."

Oxalis phaeotricha Diels, Bot. Jahrb. 37: 424. 1906; 110.

Many stemmed, early glandular but soon merely rusty hirsute or glabrate, including the petioles and peduncles and leaflets beneath; stems to 3.5 dm. tall, erect, or, fide Knuth, ascending or suberect, sparsely foliate below, shortly branched and densely leafy above; petioles about 2 cm. long, the adnate basal membranous stipules 2–4 mm. long; leaflets glabrous above, elongate- or spathulate-obcordate, broadly or narrowly incised, 10–15 mm. long, 6–7 mm. wide, glaucous, narrowly hyaline-margined; peduncles solitary, 2–4-flowered, 4–9 cm. long, erect; bracts subulate, 2 mm. long; pedicels about 1 cm. long, recurving; flowers 14–18 mm. long; sepals linear-lanceolate, narrowed to tip but obtuse, subhirsute, 8 mm. long, 2 mm. wide, the conical corolla with cuneate-obovate yellow petals with brownish-red veins; longer stamens shortly dentate, pubescent as styles, longer than sepals, or, fide Knuth, glabrous.—The var. *glabra* Knuth, with type, designates more slender entirely glabrous plants. Allied by author to *O. mollis* and *O. pichinchensis* (*O. lotoides*) but ex char. apparently nearly *O. medicaginea.*

Junín: East of Palca in grass steppes among scattered shrubs, 3,500 meters, (*Weberbauer 2486*, type); 249.

Oxalis Philippii Knuth, Meded. Rijks Herb. Leiden 27: 67. 1915; 247.

Bulb about 1 cm. in diameter, with lanceolate carinate scales that are villous-lanate within; petioles 3–4 cm. long, glabrous or nearly; leaflets cuneate-obcordate, lightly incised, glabrous above, cellulose-lacunose beneath, more or less long-ciliate marginally, to 9 mm. long, 10 mm. wide, often smaller; peduncles 2–5, about as long as the petioles, bibracteolate a little below the flowers with obtusish, or erose lanceolate-ovate bracts 2–3 mm. long; sepals mostly deep purple tinged apically and long-ciliate toward acutish or obtusish tip, otherwise glabrous, 5–6 mm. long, equaled by the styles, shorter than the stamens, both stamens and styles minutely puberulent; petals broadly cuneate, 15 mm. long, said to be violet-blue.—Author describes sepals in key as "obtuse." Species with others apparently very near indeed to *O. eriolepis*, to which Weberbauer plants were referred, once. It seems probable however at this time that the Peruvian plants at least are more properly referable to *O. minima.*

Peru: Fide Knuth; cf. *O. minima.* Chile; Bolivia.

Oxalis picchensis Knuth, Repert. Sp. Nov. 29: 214. 1931.

Subhirsute including the sepals; root slender; stem 2–4.5 dm. long, about 1.5 mm. thick below, procumbent to the middle and sparsely leafy then erect, subsimple, becoming densely leafy and 2.5 mm. thick, the upper part nearly villous the lower pilose and not rarely bearing bulblets 5 mm. thick as in *O. tuberosa;* leaflets pale green, densely appressed-hirsute beneath, sparsely so above, equal or sometimes the lateral somewhat oblique, sessile, broadly obcordate, to nearly 2 cm. long, a little broader (or smaller), the sinus broad, to one-eighth incised, stipules 8–9 mm. long, mostly adnate; peduncles axillary, often 6 cm. long, with apical umbel of 1–3 bright yellow flowers, the very acute bracts 4–6 mm. long, the almost villous pedicels 10–15 mm. long; sepals linear or nearly, 7 mm. long, acute, shorter than the styles, subequaling the longer filaments; petals 13 mm. long.—Section *Ortgieseae* (Knuth). Apparently distinct from *O. Sternbergii*, greener, more slender; type not seen; other material except Balls with smaller leaflets; long filaments pilose in specimens seen.

Apurímac: Strictly erect but with long prostrate runners, open grassy area, 3,200–3,650 meters, Ampuy, *Goodspeed Exped. 10627; Vargas 760.*—Cuzco: Cerro Piccho, (*Herrera 2806*, type). Huailabamba, Prov. Paucartambo, *Balls B6737*. Talus slopes, Asunción Bridge, Río Apurímac, 3,730 meters, *Vargas 11029*. "Occa-occa," "Occa-chchullca."

Oxalis Pickeringii Gray in U. S. Expl. Exped. Bot. 1: 323. 1854; 123. *O. inflata* Knuth, Notizbl. Bot. Gart. Berlin 7: 302. 1919; 123.

Erect much branched annual about 1 dm. high, glandular-subviscous except for the petals or the faces of the leaflets; root 2–4 mm. thick, very tortuous; leaflets obcordate or reniform, to 4 mm. wide and long, glaucous, cordate or retuse at base, broadly incised apically; middle petiolule 1–2 mm. long; petioles often 2 cm. long; peduncles 1.5–2 cm. long, cyme branches to 2 cm. long; pedicels 1–4 mm. long; sepals narrowly lanceolate, acute, 4 mm. long; petals yellow, 10 mm. long to three-fourths connate in an inflated tube; stamens and styles pubescent, the larger stamens longer than the styles, shorter than the petals; capsule ovate, 3–3.5 mm. long, with 3–4 seeds in each cell.—This is Knuth's description of his species, which he noted as probably a synonym of *O. Pickeringii* but not certainly; however the characteristic corolla of *O. inflata* seems to be evident in the Gray plant.

Lima: Near Baños, *Wilkes Exped.*, type.—Huancavelica: Above Pisco between Huauyanga and Pampano, stony places with Cacti, etc., 1,000 meters, *Weberbauer 5385* (type, *O. inflata*).

Oxalis Poeppigii Prog. in Mart. Fl. Bras. 12, pt. 2: 511. 1877; 90. *Acetosella Poeppigii* (Prog.) Kuntze, Rev. Gen. 1: 93. 1891. *O. ovalis* Ruiz ex Knuth, Notizbl. Bot. Gart. Berlin 7: 294. 1919; 91.

Strict herb to 7 dm. tall, or shrubby with strict terete herbaceous branches the younger hirtellous with subappressed or early more or less spreading trichomes; petioles little longer to twice as long as the leaflets, these oval or oblong-oval or slightly obovate, rounded both ends or very shortly acute at base, ashy tomentose and nervose beneath, 2.5–4 cm. long, 1.5–2 cm. wide, peduncles 3–7 cm. long, tomentulose; inflorescence subumbellate; pedicels 2–5 mm. long; sepals ovate, rather hirsute, 3 mm. long, 5–7 mm. long in fruit; corolla flavescent, 5–7 mm. long; filaments glandular at base, the larger more or less barbate with somewhat spreading trichomes, not denticulate; styles hispidulous or, in short-styled flowers, glabrous; capsules ovoid-rotund, glabrous in the Peruvian form, about equaling the calyx, the cells 2–3-seeded; this is var. *segetalis* [Poeppig] Prog., the leaves pubescent above with long-appressed trichomes and some obscure and minute stellate ones; var. *canescens* Prog., Brazilian plant, has the leaves ashy stellate pubescent above.—*O. hedysaroides* HBK., 57, reported as near as Ecuador, in the typical Colombian form has ovate leaflets minutely retuse at tip. F.M. Negs. 19204; 32455 (var. *segetalis*); 29559 (*O. ovalis*).

San Martín: Tocache, *Poeppig* (type, var. *segetalis*). Juanjuí, *Klug 3886* (det. Standley). Zepelacio, *Klug 3463* (det. Standley).—Junín: Slender shrub with elongate branches, near Perené Bridge, *Killip & Smith 25274*. Río Seco near La Merced, *Soukup 2504*.—Loreto: Balsapuerto, *Klug 2859*. Without locality, *Ruiz & Pavón* (type, *O. ovalis*). Brazil.

Oxalis polyantha Walp. Nov. Act. Acad. Leop.-Carol. 19: Suppl. 1: 319. 1843; 130. *Acetosella polyantha* (Walp.) Kuntze, Rev. Gen. 1: 92. 1891.

Sometimes a dm. high or higher and the 1–5 more or less palmately branched stems somewhat ligneous, the trifoliate leaves many at the branchlet tips and well exceeded by the umbels of 4–10 rose-colored flowers; petioles glabrous or very sparsely pilose, to 6 cm. long;

leaflets obcordate, acutely incised one-third to two-fifths, glabrous or minutely pilose beneath, often 7 mm. long, 6 mm. wide; bracts more or less pilose, linear-subulate, to 2 mm. long; pedicels filiform, to 5 mm. long, sepals ovate, acutely acuminate, 3–4 mm. long exceeded by the larger stamens; petals about 10 mm. long, narrowly cuneate, retuse-rounded; styles densely puberulent; seeds solitary in each cell.—The var. *peruviana* Walp. has smaller leaflets pilose beneath. *O. trichocalyx* Steud. Nomencl. ed. 2. 2: 242. 1841, and Flora 443. 1856, may, fide Knuth, be the same. F.M. Neg. 26342.

Puno: Toledo, 5,000 meters, *Meyen* (type, var.). Chile.

Oxalis polyrhiza Knuth, Repert. Sp. Nov. 29: 217. 1931.

Caudex often 5 cm. across, fleshy ligneous, articulately branched, bearing many little stems 3–10 cm. long mostly 2–3 mm. thick above, or apically with rather many leaves and peduncles equal in length, the latter 2–6-flowered the former glabrous, and with subsessile broadly cordate somewhat oblique leaflets often 9 mm. wide and long, with obtuse sinus 1–2 mm. deep; petioles often 1 dm. long, densely white hirsute below; bracts linear-subulate, hirtellous, to 3 mm. long; sepals oblong-lanceolate, obtuse or rounded, 6 mm. long, glabrous, not rarely reddish, the purple petals twice as long, broadly obovate, veined, the larger stamens a little shorter.—Section *Carnosae* according to the author but ex char. apparently another race in the *O. peduncularis* complex; he did not describe the filaments.

Cuzco: Hills of Saxaihuamán, 3,600 meters, (*Herrera 2726*, type).

Oxalis pseudolobata Knuth, Pflanzenreich IV. 130: 244. 1930.

Acaulescent, 8–17 cm. high, from a subrotund bulb about 7 mm. thick that is densely covered with sparsely lanate lanceolate scales about 6 mm. long; peduncles only one from each bulb (as to type, this without leaves), almost thread-like, to 13 cm. high, 1-flowered, glabrous as the sepals and pedicel, the opposite linear-subulate acute bractlets 1–2 mm. long, minutely red-callose at tip; corolla crateriform, 13 mm. long, yellow, with retuse rounded, broadly cuneate entire petals; sepals lanceolate, acute, 4–5 mm. long, tipped like bracts; stamens and styles hirsutulous.—Name originally written with a hyphen. The type is mixed with *O. arenaria* and is so broken that the flowers are doubtfully precocious; the leaves may have been detached, and lost; otherwise except for slight differences, especially

in measurements, this seems to be essentially *O. punensis* to which I would refer it, that being a preferable name, same date. *O. lobata* Sims of Chile, 243, is quite different, its bulbs densely fibrous, its sepals obtuse.

Cuzco: Paucartambo Valley, Hacienda Churú, 3,500 meters, *Herrera 1398* (part), type.

Oxalis ptychoclada Diels, Bot. Jahrb. 37: 425. 1906; 187.

Glabrous, except the narrow ciliate-pilose short stipules and leaflets beneath, sometimes 1.5 dm. long from a much forked root to 5 mm. thick with stout woody tortuous rootlets, the stems forked or branched from the base, to 7 cm. high, 4 mm. thick, procumbent-erect, ligneous, densely scaly below with the petiole bases and stipules, the leaves rosulately congested with the peduncles at the tips; leaflets obcordate, thin-margined, (6) 7–10 mm. long, 5–8 mm. wide, lightly incised with broad sinus, glaucous and glabrous above, pilose especially near midnerve beneath; petioles 1–5 cm. long; peduncles few, 5–7 cm. long, the 4–10 flowers on lax filiform pedicels about 1 cm. long; bracts very acute, 2–3 mm. long; sepals oblong-lanceolate, acute, (4) 6–7 mm. long, the entire apically rounded petals 12–14 mm. long, reddish-brown striate; longer filaments subglabrous, dentate, 6–7 mm. long, the styles puberulent.—Knuth designates both Weberbauer specimens as "type," and distinguishes the species from his *O. paucartambensis* by the shortly forked instead of umbelliferous peduncle, and from *O. pedunculares* by fewer flowers, shorter forked peduncle!

Junín: Tarma, in rocky outcrops, 3,000 meters, (*Weberbauer 2357*, type); 176; 180. La Oroya, on rocks, 3,700 meters, (*Weberbauer 2568*, fide Diels).

Oxalis puberula Phil. Anal. Univ. Chile 2: 332. 1865; 122.

A densely leafy little annual much like *O. micrantha* but obviously glandular-puberulent even to the narrowly lanceolate sepals, and the flowers to about 10 mm. long; leaflets usually 6 mm. long and broad; petioles to 5 cm. long, nearly as long as the furcate several-flowered peduncles; bracts setaceous, 1 mm. long; pedicels 5–10 mm. long; stamens pilose; seeds 2 in each cell.—If the following determination was correct it extends the species north from Atacama, Chile.

Arequipa: Near Mejía, (*Günther & Buchtien* 258, det. Bruns). Chile.

Oxalis punensis Knuth, Pflanzenreich IV. 130: 246. 1930. *O. quispicanchensis* Knuth, Repert. Sp. Nov. 29: 218. 1931.

Acaulescent, glabrous, a few cm. to 2 dm. tall or taller, from a rounded bulb about 1 cm. in diameter, the many pale brown scales lightly lanate; peduncles and leaves few, the former 3–20 cm. long, 1-flowered, 10–17 mm. below the apex with 2 basally connate acutish or obtusish ovate bractlets about 2 mm. long, the latter with lax petioles 3–18 cm. long; leaflets broadly obcordate, obtusely 2 mm. excised, to 1 cm. long, 1.5 cm. wide, cellulose-lacunose below, marginally dark callose-striate; sepals lanceolate, acutish, about 6 mm. long with 2 slender calli at tip; petals broadly cuneate, retuse-rounded, entire, pale purple, forming a conical corolla 18 mm. long; styles of long styled flowers longer than sepals.—Seems too much like *O. oreocharis;* in the key the author describes the petals as yellow! Cf. also *O. pseudolobata* which in all probability should be included but more material from type localities desired. Since leafy the Apurímac specimen is cited here, but it has the smaller flowers of *O. pseudolobata* and resembles closely the Bolivian *O. platylepis* Wedd., 262, which ex char. has glabrous bulb scales, shorter sepals, maybe doubtful characters. Ex char. *O. quispicanchensis* seems very doubtfully to be specifically distinct unless these differences are taxonomically sound: bulb hirsute-lanate, leaflets 6 mm. long, 7–8 mm. wide, obovate with wide sinus, bracts 1 or 2, filiform, corolla white, 16 mm. long, sepals 5–5.5 mm. long, stamens sparsely ciliate, all in my experience, admittedly slight, reasonable variations for any specific unit.

Cuzco: Marcapata, 3,100 meters, grassy places in woods, *Weberbauer 7808* (type, *O. quispicanchensis*).—Apurímac: Sandy clay canyon, Andahaylas, 3,050 meters, *Stork & Horton 10724.*—Puno: Occa Pampa, Prov. Huancane, *Shepard 69,* type, Gray Herb.

Oxalis Regnellii Miq. Linnaea 22: 545. 1849; 205. *Acetosella Regnellii* (Miq.) Kuntze, Rev. Gen. 1: 93. 1891.

Acaulescent, 1–2.5 dm. high in flower; rhizome about 5 cm. long, densely imbricate-squamose and with tubercles 7 mm. thick; leaves rosulate, only 4–9 or few, the glabrous petioles 10–15 cm. long, not dilated at base, the leaflets deltoid, even very broadly so, minutely incised or subentire with divaricate obtuse lobes, to 2.5 cm. long, twice as broad, often smaller, pale green, glabrous above, sparsely or scarcely pilose beneath; peduncles 10–15 cm. long, only 1–4, glabrous as pedicels (2–4 cm. long) and calyces, the umbel simple,

3–7-flowered; sepals linear-lanceolate, minutely reddish-bicallose at acute tip, 5–5.5 mm. long, the larger stamens longer and as the styles hirsute; corolla white, at least 4 times longer, with oblanceolate rounded apically entire petals; capsule columnar, nearly glabrous, with many seeds in each cell.—Illustrated, Knuth, l.c. *fig. 16*, page 213, and Norlind, Arkiv Bot. 14, pt. 6: *pl. 1*. F.M. Neg. 35688.

Loreto: Middle Ucayali, (*Tessmann 5469*, det. Knuth). Brazil to Argentina and Paraguay.

Oxalis rigidicaulis Knuth, Repert. Sp. Nov. 40: 290. 1936.

Stems densely strigillose-pilose even to the trailing base where leafless and rooting, 2 or 3 dm. long to 3 mm. thick at base, simple, more or less erect above, the alternate leaves finally remaining only on the upper third and often 1.5–2 cm. remote, their slender glabrous petioles 2–3 cm. long; leaflets subequal but the lateral mostly strongly oblique, all sessile, green, to 14 mm. long, 16 mm. wide, very obtusely incised to 3 mm., the semiovate lobes obtuse; stipules none or minute; peduncles often 4 cm. long not rarely with two branches of 3–6 yellow flowers; bracts acute, 1 mm. long; pedicels 3–7 mm. long; sepals 4 mm. long, linear-lanceolate, acutish, the spathulate-obovate petals nearly to quite twice as long; long-styled flowers with styles exceeding sepals; filaments glabrous.—Section *Ortgieseae*, according to the author, who describes the plant as completely glabrous; the lower part of the ascending stems are more or less coated with soil; the type appears abnormal, probably a state of *O. Ortgiesii* Regel.

Junín: Dos de Mayo, Pichis Trail, 1,800 meters, *Killip & Smith 25873*, type.—Huánuco: Moist open slopes, 3,100 meters, Saria-pampa, *Woytkowski 297*.

Oxalis San-Miguelii Knuth, Pflanzenreich IV. 130: 432. 1930. *O. machupicchuensis* Knuth, Repert. Sp. Nov. 40: 289. 1936.

Perennial, the tomentose stems about 3 dm. high, simple or a little branched at base where about 5 mm. thick, medially and below clothed only with the very acute linear-subulate 4 mm. long free stipules; petioles 1.5–3.5 cm. long, densely lanate-tomentose; leaflets sessile, equal, densely sericeous, lanate beneath, sparsely pilose at maturity above, broadly ovate or obovate, with more or less cuneate base, 17–20 mm. long, about 11 mm. wide, the shallow sinus 1–2 mm. deep; peduncles including the bibranched 2–6-flowered umbel to 7 cm. long, the umbel branches often 4–10 mm. long; bracts subulate, 1–4 mm. long, hirtellous; pedicels filiform,

2–6 mm. long, glabrous as the oblong-lanceolate obtuse pale green sepals, these 7 mm. long; petals narrowly obovate with long claw, beautiful yellow, 12–15 mm. long; stamens and styles spreading-hirsutulous.—Allied by author to *O. melilotoides* Zucc. Knuth distinguishes his second species from those of section *Ortgieseae* by the "obovate leaflets, lanuginose indument, manifestly bibranched cymes and obviously erect simple stems"; a similar plant from La Paz, Bolivia, has been determined by Johnston *O. crenata* Jacq. but since the monographer includes that species in *O. tuberosa* I do not adopt here the Jacquin name, unknown to me.

Cuzco: Valley of the San Miguel, Machu-picchu, 2,400 meters, *Herrera 2044*, type. Valle de Urubamba, Machu-picchu, 2,200 meters, *Herrera 3315* (type, *O. machupicchuensis*). Bolivia?

Oxalis sepalosa Diels, Bot. Jahrb. 37: 426. 1906; 186. *O. Buchtienii* Bruns, Mitt. Inst. Allgem. Bot. Hamb. 8: 51. *fig. 7.* 1929.

Habit of the related *O. megalorrhiza* but in flower 2.5–3.5 dm. high and the 7–15 cm. tall stems especially beneath the apical foliage densely scaly with the brown foliaceous stipules; leaflets sometimes arachnoid beneath, often 2.5 cm. long, 3.5 cm. wide and one-fourth incised with broad sinus; petioles 12–15 cm. long; peduncles 12–20 cm. long with pale foliaceous ovate acute bracts to 7 mm. long and glabrous, 6–20-flowered umbels (in age 2–3-forked), the pedicels 10–17 mm. long; sepals unequal, the larger broadly ovate or subdeltoid, obtuse or rounded, pale margined, 10–12 mm. long, 7.5–9 mm. wide, two narrowly oblong, 2 mm. wide; corolla wide-open, the yellow rounded entire petals 2 cm. long (or late flowers much smaller); larger stamens glabrous, longer than sepals, styles minutely puberulent.—Bruns compared his species with *O. dolichopoda;* it is probably restricted to the lomas and (if not an earlier described Chilean species) related as Diels noted to *O. megalorrhiza* but seems to be well distinct by the large stipules and almost foliaceous bracts. The Bruns plant, nearly past flowering, has open forked inflorescence, flowers only 6 mm. long, differences, it seems to me, from Diels plant as described due to age. F.M. Negs. 29561; 20923 (*O. Buchtienii*).

Arequipa: On rocks in the lomas, 400 meters, *Weberbauer 1519*, type; 94; 146. Loma north of Atiquipa under bushes, *Worth & Morrison 15669* (det. Johnston, *O. lomana*); also west of Atiquipa, *15656*. East of Chala, *Worth & Morrison 15608* (det. Johnston,

O. lomana). Ravine near Mejía, (*Günther & Buchtien 254*, type, *O. Buchtienii*). Cachendo, (*Günther & Buchtien 255*, det. Bruns).

Oxalis solarensis Knuth, Notizbl. Bot. Gart. Berlin 7: 306. 1919; 201. *O. arequipensis* Knuth, Pflanzenreich IV. 130: 188. 1930. *O. ornata* Phil. Fl. Atac. 13. 1860, at least as to Peru.

Perennial, with a thick shortly branched vertical rhizome 10–15 mm. across above, ligneous, bearing many leaves and peduncles at the neck, the latter sparsely pilose as the petioles and with an irregular dichotomous cyme of 4–14 flowers; leaves to 9 cm. long, fleshy, the equal leaflets cuneate- or deltoid-obcordate, often a little oblique, subretuse but obscurely incised, to 2 cm. long, 2.5 cm. wide, mostly smaller, arachnoid and hyaline papillose beneath, glabrate above; bracts 2–3 mm. long, acute; pedicels 3–10 mm. long, glabrous; outer sepals evidently triangular-dilated at base, rounded at tip, 4–5 mm. long or a little longer in age, 2.5 mm. wide, the inner narrower; corolla three to four times longer, yellow, the petals spathulate-lingulate; styles 6 mm. long, the larger stamens shorter.—Apparently with reason Johnston noted in herb. "perhaps not distinct from *O. megalorrhiza.*" The Huánuco specimen, entirely out of range, has smaller flowers, smaller leaflets.

Lima: Mount Morro, Chorillos, at lower edge of lomas, *Weberbauer 5690*, type. Above Chosica, *Horton 10991* (det. Johnston). Below Matucana, stony outcrops, *Weberbauer 5201*. Eulalia Valley, *Goodspeed & Stork 11498* (det. Johnston).—Huánuco: Common on adobe walls, also on open grassy slope, 2,400 meters, *Woytkowski 261* (doubtful).—Arequipa: Yura, stony places with small shrubs, *Weberbauer 6841* (det. Knuth). Tingo, *Pennell 13117* (det. Knuth, *O. carnosa*). Rock ledges above Arequipa, *Pennell 13192*, type, *O. arequipensis*. Rocky ravines, Chachaní Mountains north of Arequipa, *Hinkley 27* (det. Knuth, *O. ornata*). North of Atiquipa, *Worth & Morrison 15631* (det. Johnston, *O. megalorrhiza*). "Chunco" (Hinkley).

Oxalis spiralis R. & P. ex G. Don, Gen. Syst. 1: 755. 1831; 107. *O. pubescens* HBK. Nov. Gen. & Sp. 5: 240. 1822, fide Knuth, not Stokes, 1812. *O. bifida* Willd. ex Zucc. Denkschr. Akad. Muench. 9: 162. 1823–24 (name only), not Thunb. 1781.

Succulent-herbaceous, 3–5 dm. high, early erect or ascending, or trailing in age, little branched, sparsely lanate pubescent including the leaves below and peduncles, the latter not crowded apically,

6–12 cm. long and bearing a bifurcate 6–12-flowered cyme; leaflets equal, sessile, obcordate, the tips openly emarginate, often 2 or about 2.5 cm. long, 1.5–2 cm. wide (in *O. pubescens*, 1 cm. by 1 cm., pubescent both sides), glabrate above; petioles to 7 cm. long; cyme branches 2–5 cm. long; bracts linear-lanceolate, acute, 2–4 mm. long, densely pubescent as the 3–8 mm. long pedicels; sepals 5–6 mm. long, obtusely acuminate, often purplish and glabrate above; petals about 6–9 mm. long, spathulate, pale yellow; longer filaments as styles puberulent, a little longer than the sepals; capsule glabrous, ovoid-cylindric with many (3–4 in *O. pubescens*) seeds in each cell. Type locality of *O. pubescens* "Peru." There is a var. *glandulosa* (Knuth) Macbr. Candollea 6: 9. 1934 (cyme glandular) in Colombia and Venezuela. F.M. Neg. 35684 (*O. pubescens*).

Lima: *Raimondi*.—Piura: Chorro Blanco, succulent stems rambling for 1 meter, *Stork 11408* (det. Johnston, *O. crenata*).—Cajamarca: *Raimondi*.—Huánuco: San Rafael, *Soukup 2242*, Puente Durand, *Stork & Horton 9585* (det. Standley, *O. melilotoides*); also *9379*, river bed south of Huánuco. Above Pillao, *Woytkowski 34030*.—Ayacucho: Ccarrapa, 3,000 meters, *Killip & Smith 22277* (det. Killip). Pampalca, *Killip & Smith 22255* (det. Killip).—Cuzco: Urubamba Valley, *Cook & Gilbert 952*. Ollantaytambo, (*Cook & Gilbert 600*). Machu-Picchu, (*Cook & Gilbert 851*). "Pillahauta," *Pennell 13986* (det. Knuth). Paucartambo Valley, *Herrera 1814*.—Puno: Sicuaní, (*Cook & Gilbert 152*). Limbani, Prov. Sandía, *Metcalf 30427* (det. Leonard). Without locality, *Ruiz & Pavón*, type; *Bonpland* (type, *O. pubescens*). Chile and Argentina to Panama. "Chuco" (Quechua, Stork and Horton).

Oxalis Spruceana Prog. in Mart. Fl. Bras. 12, pt. 2: 481. 1877; 53. *O. frutescens* R. & P. ex G. Don, Gen. Syst. 1: 754. 1831, not L. *O. sublignosa* Knuth, l.c. 95 (name change for *O. frutescens*).

Suffruticose, to 3 meters high, the stems squarrosely much branched above, the densely leafy branches arcuate-spreading-erect, minutely but densely gray-puberulent with crisped trichomes, this indument extending to sepals and capsule (or these even sericeous), sparse only on the upper side of the leaflets which are lanceolate, acute or obtusish, the medial 5–10 mm. long petiolate, usually 4–6 cm. long, 1–2 cm. wide, the lateral smaller; petioles 1.5–4 cm. long; peduncles many, 2–4 (6) cm. long, umbellately 3–8-flowered; bracts subulate, to 2 mm. long; pedicels 1–3.5 mm. long; sepals lanceolate, acute, about 3 mm. long, the pale yellow (often with 2 orange-red

basal marks) narrowly cuneate petals 5–7 mm. long; larger stamens puberulent, longer than sepals, the globose capsule scarcely as long and with 1 seed in each cell.—Knuth describes stamens of *O. sublignosa* as glabrous but they are puberulent in type. *O. rhombifolia* Jacq., known from Mexico to Colombia and Venezuela, is sparsely branched with erect branches, has somewhat longer sepals. F.M. Negs. 26348; 26353 (*O. sublignosa*).

San Martín: Tarapoto, *Spruce 3919*, type; *Ule 6443*. Without locality, *Poeppig*.—Junín: Río Perené, *Killip & Smith 25200; 25418*. Oxapampa, *Soukup 2402*. La Merced, openly wooded slope, *5334*.—Huánuco: More open rocky slopes, Pozuzo, *4607* (det. Knuth); *Ruiz & Pavón* (type, *O. frutescens*). North of Tingo Maria, gravelly bank, *Stork & Horton 9450* (det. Standley).—Cuzco: Echarate, Prov. Convención, edge of forest, *Goodspeed Exped. 10502* (det. Standley).

Oxalis Staffordiana Knuth, Repert. Sp. Nov. 38: 195. 1935.

Similar to *O. megalorrhiza* and *O. paucartambensis;* petioles 1–3.5 cm. long, glabrous with broad basal marcescent stipules about 3 mm. long; leaflets glabrous or at margins and beneath on veins sparsely ciliate-pilose, 1–2 mm. incised, 6 mm. long, 5 mm. wide, subsessile, ecallose; peduncles 1–3-flowered, 1.5–3 cm. long, in herb. nearly filiform as the 1 mm. long bracts; pedicels 6–8 mm. long; sepals obtuse or nearly retuse, to 5 mm. long; petals orange, beautifully purple-nerved, long-cuneate, to 13 mm. long; larger stamens a little longer than the sepals.—Affine *O. paucartambensis* according to the author, who did not describe the filaments!

Cuzco: In rocks, 3,000–4,000 meters, (*Stafford*, Herb. Kew, type).

Oxalis Sternbergii Zucc. Denkschr. Akad. Muench. 9: 156. 1823–24 and Abh. 1: 220. 1829–30; 171. *O. Commersonii* Pers. Syn. Pl. 1: 519. 1805 as to Peru plant. *O. petrophila* Knuth, Notizbl. Bot. Gart. Berlin 7: 300. 1919; 159. *O. longicalyculata* Knuth, Repert. Sp. Nov. 23: 279. 1927; 170. *O. colquipatensis* Knuth, Pflanzenreich IV. 130: 433. 1930.

More or less sericeous villous even the sepals minutely, these linear-lanceolate or subligulate, obtusely acute, 7–10 mm. long; stems procumbent-ascending, to 2.5 dm. long or longer, about 2.5 mm. thick below where defoliate and in old plants ligneous, with the petiole bases more or less persisting, densely foliate above the filiform or slender petioles 3–7 cm. long little exceeded by the 1–3-

flowered, rarely irregularly 3–5-flowered peduncles, these with 2 subulate bractlets one or two cm. below the calyx, there refracting in fruit; leaflets broadly obcordate, the lateral often oblique, all slightly wider than long, rather acutely emarginate (1–2 mm. or so), usually 10–12 mm. wide, sometimes smaller, usually less pubescent above than below; stipules membranous free only at the scarious tips, these sometimes 2–3 mm. long; petals yellow or red dotted toward base, 15–17 mm. long; stamens and styles pubescent, sometimes minutely and obscurely.—If I may judge from an earlier observation and now from the negative the plant of Zuccarini is not the same as that of Persoon; but maybe the Munich Haenke specimen (actual type, herb. Sternberg) was not correctly named. In any case I see no fundamental differences between the three species of Knuth cited. *O. Commersonii* apparently has much more deeply incised usually smaller leaflets, shorter sepals, whitish flowers. F.M. Neg. 19211.

Used according to Herrera, for treatment of "thrush," an oral fungous infection.

Cuzco: Hacienda Churú, Valle de Paucartambo, *Herrera 1043* (det. Killip, *O. petrophila*). Cuzco, 3,000–3,600 meters, *Herrera* (type, *O. longicalyculata*). Cerro de Colquipata, rocky cliff, 4,100 meters, *Pennell 13737* (type, *O. colquipatensis*). Between Pisco and Paucartambo, 4,100 meters, *Weberbauer 6918* (type, *O. petrophila*). Acanacu, 3,500 meters, among shrub, *West 7053* (peduncles 2–5-flowered, det. Johnston, *O. pubescens*). Without locality, *Soukup 1184*. Without locality, *Haenke*, type. Bolivia? "Occa-occa," "occa-chchullcu."

Oxalis subintegra Knuth, Notizbl. Bot. Gart. Berlin 7: 298. 1919; 133.

Scandent, the few stems about 1 meter long, 3–5 mm. thick, glabrous, the rather remote short branches scarcely ligneous, their internodes 3–7 cm. long, the nodes slightly enlarged; branchlets slenderer, leafy, to 8 cm. long; leaves rosulate or alternate, on glabrous or somewhat pilose petioles to 3 cm. long; leaflets rhomboid- or lanceolate-oblong, cuneate at base, lightly incised with rounded lobes, beneath and marginally villous, subglabrous above, about 3 cm. long, 10–12 mm. wide, the 1 mm. long petiolules hirsute; stipules to 9 mm. long, villous, nearly completely adnate; peduncles erect, about 5 cm. long, glabrous as pedicels, bracts, and calyces, the first 5–12 mm. long, the second acute to 3 mm. long, the last 8 mm. long, the sepals narrow and very acute; flowers more or less nodding on two

branches, orange yellow or violet (Mathews spec.), to 17 mm. long, the cuneate petals retuse; larger stamens little shorter than calyx, glabrous as the styles.—F.M. Neg. 26352 (Mathews).

Piura: In shade of shrubs and trees, Prov. Huancabamba, 2,900 meters, *Weberbauer 6092*, type.—Amazonas: Chachapoyas, *Mathews 3015*.—Huánuco: Huacachi, forming a tangled mass, *4092* (det. Knuth). Ecuador.

Oxalis tabaconasensis Knuth, Notizbl. Bot. Gart. Berlin 7: 299. 1919; 134.

Procumbent or scandent, sometimes about 6 dm. long, the somewhat sulcate stems about 2 mm. thick, pubescent especially on the leafy 2–10 cm. long branches; leaflets all 1 mm. long, petiolulate, papyraceous, green but rather densely and softly appressed pilose, often 15 mm. long, 9 mm. wide, cuneate oblong-obovate, the rounded tips 1 mm. emarginate; petioles 2–2.5 mm. long, pilose-hirsute, with 1 mm. long soon deciduous stipules; peduncles about 2 cm. long, pilose below in type, glabrous above as the pedicels, bracts, and calyces, the 1–5-flowered cyme irregular; bracts linear-subulate, to 3.5 mm. long; pedicels 5–12 mm. long; sepals pale green, elongate-oblong, obtuse, 7 mm. long slightly exceeded by the larger glabrous stamens, the short-styled flowers with styles glabrous; petals orange-yellow or yellow, 12–15 mm. long, broadly dilated from a narrow base.—Unknown to me but apparently the following Huánuco specimens belong here or possibly to *O. mollis*, but the hirsute stipules are free, not membranous.

Cajamarca: Edge of grass steppe formation above Tabaconas, Prov. Jaén, (*Weberbauer 6305*, type).—Huánuco: Exposed rock bank, Muña, *4281* (det. Knuth, *O. lotoides*). Sariapampa, *Woytkowski 34297*. Pillao, *Woytkowski 34161*.

Oxalis Tessmannii Knuth, Repert. Sp. Nov. 23: 141. 1926; 83.

Arborescent, attaining 2 meters, the stem 3 cm. thick at base, simple to about 1 and a half meters where squarrosely branched, the younger densely leafy branchlets puberulent; lateral leaflets subsessile, the medial with slender petiolule about 2 cm. long, all lanceolate, gradually and acutely acuminate, entire, glabrous or beneath on nerves minutely puberulent, the lateral 7–8 the medial 11 cm. long, 3–3.5 cm. wide; peduncles scarcely 1 dm. long, glabrous, with apical irregular but not bibranched cyme of 6–8 flowers, the pedicels unequal in length, filiform, often 2 mm. long; sepals 2.5 mm. long,

ovate, obtuse, the yellow petals one and a half times longer.—Apparently too near *O. polymorpha* Zucc., 78, of Brazil or related "species" as *O. suffruticosa* Salzm., 80, as also *O. Macbridei*, 431. A revision of the genus by an able taxonomist is much needed.

Loreto: Mouth of the Santiago in flooded highwood at edge of the Río Marañón, (*Tessmann 4484*, type).

Oxalis tuberosa Molina, Sagg. Nat. Chile 3: 109. 1782; 109. *Acetosella tuberosa* (Molina) Kuntze, Rev. Gen. 1: 92. 1891. *O. crenata* Jacq. Oxal. 27. 1794, fide Knuth.

Rhizome branches often tuberiform the tubers even 4 cm. long, 3 cm. thick (or nearly twice as large in cultivation) and bearing a number of triquetrous scales; stems densely pubescent, erect, about 3 dm. high, simple or little branched, densely foliate especially at and above the middle; petioles 7–10 cm. long, like the much longer peduncles sparsely hirsute or glabrate; leaflets equal, pale green, more or less densely hirsute both sides, fleshy, sessile, about 2.5 cm. long, 22 mm. wide, the very broadly rounded tips to one-eighth incised, the lobes rounded; stipules to 15 mm. long, adnate; peduncles often binate, to 17 mm. long, bearing regular or nearly regular 5–8-flowered umbel of pale yellow flowers usually about 15–22 mm. long on villous pedicels 7–20 mm. long; bracts very long; larger filaments pubescent; capsule narrowly oblong.—Last flowers in cymes may be smaller, as in my *2090*. Determinations by Knuth except as noted.

W. H. Hodge, Journ. N. Y. Bot. Gard. 47: 214–224. 1946, has given a good account with excellent photographs of this species (and Añu, *Tropaeolum tuberosum*) commonly cultivated (to at most 3,800–4,000 meters, fide Weberbauer) for its starchy tubers, which, rich in crystals of calcium oxalate, must be cured several days by leaving in sunlight when they may be eaten. They are usually boiled as potatoes. When they are to be stored a chuno, called cjaya, is prepared in the manner used for that of *Solanum tuberosum*, described by Herrera, Sinop. Fl. Cuzco 1: 284. 1941; also by Hodge, l.c. 218. The former listed "Lluchcho-occa" as well as "Sapallu," "Chachapea," "Pauccar" and "Mestiza" as native names for tubers colored red, yellow, gray, red, and black. Hill, Bull. Misc. Inf. Kew 169–173. 1939, found the color differences of tubers in Bolivia associated with long-styled flowers (yellow), medium (white), short (red).

Cajamarca: Trujillo to Cajamarca, *Raimondi*.—Lima: Above Matucana, *Weberbauer 5276;* also my *108; 2955*.—Huánuco: In underbrush, *2090* (det. Knuth, *O. melilotoides*). Among rocks,

Yanahuanca, *1231*. Erect from mossy forest floor or pendent from trees, Tambo de Vaca, *4417*. Mossy bunch grass slope, to 1.5 meters high, Chasqui, *3287*.—Junín: Stream bank, Tarma, *Killip & Smith 21917* (det. Standley).—Huancavelica: Near Cordova, *Metcalf 30271* (det. Leonard).—Apurímac: Part shade in forest, Ampuy, *Goodspeed Exped. 10606* (det. Standley).—Cuzco: Machupicchu, *Herrera 3318*. Sheltered ravine, Acanacu, *West 7054* (det. Johnston, *O. pubescens*). "Pillahuata," *Vargas 13* (det. Standley). Huaros, *Pennell 14712*. Cuzco, *Herrera 434; 454*. Hacienda Churú, *Herrera 3138*.—Puno: Commonly cultivated at Cuyo-cuyo (Weberbauer, 295). Above Sicuaní, *Cook & Gilbert 152; 152a* (det. Knuth, *O. carnosa*). Bolivia to Colombia. "Occa-occa," "bueno grillo."

Oxalis urubambensis Knuth, Repert. Sp. Nov. 29: 216. 1931.

Stem simple, ligneous, about 4 dm. high, scarred below every 5–7 mm. by the fallen petioles, foliate and densely yellowish tomentose above; stipules linear-subulate, acute, deciduous; petioles 3 cm. long, hirsutulous, soon glabrate; leaflets sessile, equal, broadly ovate, more or less oblique and cuneate at base, 2 mm. long, 1.25 cm. wide, the sinus 2–3 mm. deep, above sparsely beneath densely appressed pilose or subtomentose; peduncles 2–4, densely puberulent or glabrate, 5 cm. long, apically forked with many flowered branches 1.25 cm. long; bracts 2–4 mm. long; sepals lanceolate, pale green, glabrous, 5 mm. long, the long-clawed petals twice as long; smaller stamens half as long as larger, all glabrous; styles a little shorter than the small stamens.—Section *Myriophyllum* Knuth according to the author but ex char. comparable to *O. San-Miguelii* or possibly *O. Herrerae*.

Cuzco: Máquina, Valley of the Urubamba, 2,050 meters, (*Herrera 2699*, type).

Oxalis velutina Diels, Bot. Jahrb. 37: 425. 1906; 86.

Squarrosely branched shrub, 1 meter high, the ligneous outer branches 4–5 mm. thick, densely tomentose above as the petioles (4 cm. long) and peduncles, these axillary in the many leaves toward the tips but not apical, 4.5–5.5 cm. long, the lower part of the branches densely marked by scars of fallen petioles; leaflets ovate, the lateral little smaller, about 3.5 cm. long, 2 cm. wide, rounded both ends or even retuse at base, not rarely dotted or spotted with white, puberulent above, lanuginose-tomentose beneath; medial petiolule 7–10 mm. long; pedicels, bracts and calyces densely villous-

tomentose, the first 3–5 mm. long, the second 2 mm. long, the 5–8 umbellate flowers 10–12 mm. long; sepals lanceolate, acutish, 5.5–7 mm. long, the corolla twice as long, the broadly spathulate petals yellow; larger stamens scarcely longer than the sepals, minutely puberulent, the rounded or slightly acuminate black capsule about as long.—Seems, ex char., not specifically distinct from *O. hypopilina* and *O. psoralioides* HBK., 87, of Colombia, which as to type has emarginate slightly smaller leaflets, shortly bifid cymes. Diels remarked: new unless *O. hypopilina* but leaflets pubescent above, nerves prominent, the most tomentose of all Peruvian species. *O. loxensis* Knuth, 86, of southern Ecuador is similar but the longer leaflets are obtuse or less rounded apically, the sepals more or less acuminate, the petals to 2 cm. long, the stamens tomentulose.

Cajamarca: In open shrub-Bromeliad formation, 1,500 meters, below Santa Cruz, (*Weberbauer 4126*, type); 94; 189.

Oxalis villosula Knuth, Repert. Sp. Nov. 38: 195. 1935.

Perennial, with long oblique root and one to few simple erect rather fleshy stems to 4 mm. thick, 2–4 dm. high, glabrous below but densely lutescent-villous above the middle; leaflets subequal, oblong-obovate, cuneate at base, the very broad sinus 2 mm. deep with rounded or obtuse lobes, to 15 mm. long, 10 mm. wide, subglabrous above, densely tomentose-sericeous beneath; petioles to 3 cm. long, dilated, tomentose; peduncles as inflorescence glabrous, 5–7 cm. long, in herb. 1.25 mm. thick, the cyme 5–7-flowered; lower bracts 5–7 mm. long, subulate, acute; pedicels to 15 mm. long, nearly filiform; sepals lanceolate, drying nearly membranous, 3.5–5 mm. long, 1.25–1.5 mm. wide, the yellow-orange petals two and a half times longer, oblong-lanceolate; stamens all glabrous, the larger equaling the sepals, the smaller the puberulent high-connate styles.—Section *Ortgieseae* (Knuth).

Cuzco: Machu-picchu, Valle del Urubamba, 2,100 meters, (*Herrera 2953*, type).

Oxalis Weberbaueri Diels, Bot. Jahrb. 37: 425. 1906; 189.

Two to 3.5 dm. tall in flower the more or less densely scaly stems about 5 mm. thick, 4–14 cm. high, probably firm-succulent in life but described as ligneous, the leaves and peduncles apically crowded, the former with petioles to 4 cm. long, the leaflets somewhat appressed pubescent beneath, often about 10–15 mm. long, 7–12 mm. wide, openly emarginate, the latter usually much longer,

glabrous or sparsely pilose as the nearly filiform 5–10 mm. long pedicels, these as many as 15 in a tardily branched umbel; sepals 6 mm. long, gradually acuminate to obtusish tip; corolla long-narrowed to base, the yellow petals glabrous, retuse, entire, 18–20 mm. long; filaments subglabrous, styles glabrous.—Seems to be perhaps too near *O. pedunculariis* but the one specimen seen has glabrous filaments. The type was probably prepared by the alcohol method, which may account for its brittle ligneous quality. The author compared it to the Chilean *O. ornata* with unequal sepals.

Piura: Above Palambla in grass steppes with scattered shrubs, *Weberbauer 6023*.—Ancash: Pampa Romas in close grass-shrub formation, (*Weberbauer 3205*, type); 170; 173. In rocky places, Huaráz, 2,200 meters, (*Weberbauer 3002*, probably, Knuth). "Paza tullmasch."

Oxalis Williamsii Knuth, Repert. Sp. Nov. 38: 195. 1935.

Suffrutescent, entirely glabrous, the subsimple erect ligneous brown stem 5 dm. tall, 3–3.5 mm. thick below; leaves scarcely numerous, the subequal leaflets ovate-lanceolate or lanceolate, more or less cuneate at base and narrowed to the acute tip the middle one (petiolule to 2.5 cm. long) to 9 cm. long, 3.5 cm. wide, the 2 mm. petiolulate lateral little smaller, the common petiole to 1 dm. long; peduncles axillary in upper leaves, 3.5 cm. long, 0.5 mm. thick, bibranched apically, the 2 cm. long branchlets not rarely biparted, scarred by fallen flowers and with only a few open flowers near tips; pedicels filiform, 3–3.5 mm. long; sepals 2.5–3 mm. long, ovate-lanceolate, acute, finally ovate; petals yellow, lanceolate-obovate, scarcely 1 cm. long; larger stamens 5–6 mm. long.—Section *Thamnoxys*, affine *O. rhombeo-ovata* St. Hil., 78, of Brazil (Knuth).

San Martín: San Roque, 1,400 meters, *Williams 7751*, type; also *7204*.

2. BIOPHYTUM DC.

Caulescent, usually more or less ligneous plants with the leaves all at the top of the stem or in lateral fascicles and always multipinnate with a terminal seta. Sepals imbricate, the petals contorted. Capsule valves spreading from the axis in maturity and finally free. Otherwise like *Oxalis* and the species similarly either very much alike or not understood.

Leaflets 3–6 pairs, at least the terminal wider than 1 cm.

Sepals linear-lanceolate, subulate-acuminate.....*B. somnians*.

Sepals oblong, acuminate, with seta 0.5–1 mm. long.....*B. Foxii.*
Leaflets (at least most leaves) more than 6 pairs, often smaller.
Peduncles 1–17 cm. long.
Leaflets 8–12 pairs, the middle about 2 cm. long; peduncles to 17 cm. long.....*B. amazonicum.*
Leaflets often more numerous or smaller; peduncles 1–8 cm. long.
Leaflets often 3 cm. long; flower heads often 1 cm. across. *B. globuliflorum.*
Leaflets about half as long or smaller as also the flower heads.
Peduncles more or less hirsute.
Leaflets rounded or subobtuse apically; flowers white or pale in dense heads 4 mm. thick.....*B. peruvianum.*
Leaflets acutish; flowers violet in rather lax heads. *B. dendroides.*
Peduncles very densely setose-hispid.....*B. juninense.*
Peduncles obsolete.....*B. Tessmannii.*

Biophytum amazonicum Knuth, Pflanzenreich IV. 130: 416. 1930.

Subacaulescent, often 18 cm. high from a deep root to 5 mm. thick; petioles 1 cm. long; leaves to 15 cm. long with 9–12 pairs of broadly oblong-rectangular leaflets, the lower cordate, the upper obliquely broadly ovate, all glabrous except sparsely ciliate margins, glaucous, the medial often 2 cm. long, 10–12 mm. wide, retuse, tip retuse-rounded with mucro to 0.5 mm. long; peduncles to 17 cm. long, subhirsute as leaf-rachis, the subulate 4–5 mm. long bracts forming apical head 1.75 cm. thick; flowers often 5–15 in the head on subglabrous pedicels 2–3 mm. long; sepals 5–6 mm. long, acutely acuminate, strongly costate; petals 10 or 11 mm. long, obovate; larger stamens of medium styled flowers equaling calyx, subhirsute.—Allied by author to *B. Foxii.*

Loreto: Pongo de Manseriche, (*Tessmann*, type).

Biophytum dendroides (HBK.) DC. Prodr. 1: 690. 1824; 399. *Oxalis dendroides* HBK. Nov. Gen. & Sp. 5: 250. 1822.

Stems creeping at base the simple erect portion terete, ligneous, 7–30 cm. high, 2–4 mm. thick and yellowish-tomentose toward apex where are crowded together the 20 or more leaves, 3–11 cm. long; leaflets 10–20 pairs, 10–18 mm. long, gradually larger toward the apex of rachis, ciliate, appressed pubescent above, hirsute especially

on midnerve beneath and more or less glaucescent, the lowest ovate, acutish, the medial oblongish with an angle at inner base, the uppermost broader and obovate-subtrapezoid; petiole and rachis hirsute; peduncles 5–many, hirsute, apical, 2–5 cm. long, 1–4-flowered, the many capitulate but scarcely globulate-congested bracts linear-setaceous, 4–5 mm. long, acute, carinate, the pedicels little longer; sepals subequal, lanceolate, acute, nervose-striate, hirsute, half as long as the infundibuliform violet corolla, the cuneate petals rounded at tip; larger stamens pubescent, exceeding the glabrous or pubescent styles; capsule barely exserted, ovate-globose, 5-angled, pubescent especially toward apex, the cells 1–2-seeded.—"Mexico to Peru and Brazil" (Knuth), but no specimens cited; cf. *B. peruvianum* but it seems to me doubtful that there is more than one slightly variable species concerned. Illustrated, Knuth, l.c. 400. F.M. Neg. 36802.

Peru: Probably, sens. lat. Brazil to Mexico.

Biophytum Foxii Sprague, Kew Bull. 343. 1911; 416.

Herbaceous, erect, the appressed pilose stems about 5.5 cm. high with an apical cluster of about 8 leaves 3.5–8 cm. long; leaflets 3–6 pairs the terminal obliquely obovate, 2–3 cm. long, rarely 2 cm. wide, the remaining gradually reduced, truncate at base, the intermediate subtrapezoid, the lower triangular-ovate; peduncles 4 cm. long, crisply pubescent, many-flowered; sepals oblong, acuminate, with seta to 1 mm. long, 7–9-nerved, ciliate and papillate-pilose, about 6 mm. long; corolla white with tube 6 mm. long, the reflexed lobes 4.5 mm. long, 3.5 mm. wide; smaller stamens glabrous, about 3 mm. long, larger pilose, nearly 5 mm. long, styles 1.75 mm. long, minutely pilose for about 1 mm.—Cf. *B. somnians;* type presumably in Herb. Kew.

Peru: (*W. Fox*, type).

Biophytum globuliflorum Knuth, Pflanzenreich IV. 130: 403. 1930.

Stout, the stems 5–8 mm. thick, 1.5–5 dm. high; leaves 15–20, to 2.5 dm. long, with about 15 pairs of narrowly rectangular-lanceolate leaflets the medial often 3 cm. long, a third as wide, retuse at base, acutely and somewhat obliquely acuminate, sparsely pubescent above, moderately pilose beneath, the lower obcordate, the upper ones obliquely or falcately ovate-lanceolate; peduncles mostly 1 dm. long, densely puberulent, the very many 7 mm. long subulate-filiform bracts forming a head 1.5 cm. in diameter, the flowers 1–4 on pedicels

2–3 mm. long; sepals 6–7 mm. long, acutely acuminate, strongly costate; petals 10–12 mm. long, oblanceolate, pale yellow with pink tips or canary yellow (Mexia).—Similar but smaller is *B. bolivianum* Knuth, l.c., the leaflets obtuse or nearly rounded and hirsute. The Ecuadorian *B. Heinrichsae* Knuth, Repert. Sp. Nov. 38: 198. 1935, has leaflets retuse at base, rounded at tip, 2.5 cm. long, 8 mm. wide, stems often biparted, peduncles setose. F.M. Neg. 26289.

Loreto: Flood-free wood, Pongo de Manseriche, *Tessmann 4037*, type; also *3886* below Pongo de Manseriche. Ridge to right of mouth of Río Santiago, floor of dense forest, *Mexia 6294* (det. Standley). Bolivia. "Ambrosoccó" (Mexia).

Biophytum juninense Knuth, Repert. Sp. Nov. 38: 198. 1935.

Perennial, the simple rhizome with many brown roots; stem strict, 1–1.5 dm. high, 3 mm. thick, very densely tomentose; leaves apical, 13–20, to 12 cm. long, leaflets 15–25 pairs, narrowly rectangular, to 12 mm. long, 3.5 mm. wide, glabrous except the medial nerve long-setulose, obliquely retuse at base, obliquely rounded at tip, finally all elongate-obovate, lower leaflets gradually reduced toward base of rachis the lowest obliquely triquetrous; petioles nearly lacking; peduncles 4.5–6.5 mm. long, 0.5 mm. thick, very densely setose-hispid; bracts subulate, 2–2.5 mm. long; flowers unknown.—Section *Dendroidea*, aff. *B. dendroides* but recognized by the densely setose rachis (Knuth). This reads like a race of *B. peruvianum* if that itself is distinct from *B. dendroides*.

Junín: Cahuapanas, Río Pichis, 340 meters, (*Killip & Smith 26755*, type).

Biophytum peruvianum Knuth, Pflanzenreich IV. 130: 402. 1930.

Similar to *B. dendroides;* leaflets subequal, usually 8–12 pairs, rarely 16 mm. long, 4 mm. wide, obtuse or rounded, obscurely or not at all mucronulate, subglabrous both sides; bracts minute, globosely or cylindrically congested the resulting head about 3 mm. thick and 3–5 mm. long; flowers white or cream-colored.—Cf. Knuth who accepts but defines without clear distinctions one Bolivian and several Colombian plants as species (described previously) that like this may be variants of *B. dendroides;* however at present for reasons of expediency, since the Peruvian plant is not typical, Knuth's name, actually based on a specimen from Bolivia (*Bang 1397!*), may be used.

San Martín: Chazuta, *Klug 4043*. Zepelacio near Moyobamba, 1,100 meters, *Klug 3700*.—Junín: Río Seco near La Merced, *Soukup 2505*. Puerto Bermudez, 375 meters, *Killip & Smith 26575* (det. Killip).—Huánuco: Between Monzón and the Huallaga, 700 meters, open wood, *Weberbauer 3583;* 285. Pozuzo, *4549*. Tingo Maria, *Stork & Horton 9489; Soukup 2217*. Hacienda San Carlos, Río Ysabel, 1,000 meters, *Mexia 8139*.—Ayacucho: Kimpitiriki, Río Apurímac, *Killip & Smith 23029* (det. Knuth).—Loreto: Yurimaguas, *Killip & Smith 28910; Spruce 4588*. San Antonio de Cumbaso, *Ule 6533*. Bolivia; Brazil.

Biophytum somnians (Mart. & Zucc.) Knuth, Notizb. Bot. Gart. Berlin 7: 317. 1919; 416. *Oxalis somnians* Mart. & Zucc. ex Zucc. Denkschr. Akad. Muench. 9: 181. *pl. 4*. 1823–1824.

Perennial, with ligneous stem rooting at the prostrate base then ascending 3–5 dm., simple, terete but somewhat enlarged at nodes, subtomentose with short brownish appressed trichomes; leaves subverticillate at nodes and apex, petioled, the short petioles thick and rugose-sulcate at base; leaflets unequal, to 4 cm. long, 2.5 cm. wide, the smaller lower obliquely subcordate, acute, the larger upper obovate rounded at tip, all slightly or obscurely and bluntly extended at the lower angle of the truncate base, typically appressed pubescent with short trichomes both sides, subciliate, the rachis densely villous especially beneath; peduncles solitary, typically 7–12 cm. long, pubescent, many-flowered with numerous linear-lanceolate acuminate pubescent dry brownish bracts about the base; flowers small, semi-concealed in the crowded lanceolate subulate-setaceous ciliate-hispid bracts; sepals linear-lanceolate, glabrous but apically subciliate, subulate-acuminate, the little longer oblong obtuse petals roseate, white at base; stamens all much shorter than the pilose styles, the larger pilose above, the smaller glabrous and scarcely equaling the pubescent ovary.—After Knuth; the Peruvian plants are less pubescent with shorter peduncles and apparently slightly larger or more exserted flowers and probably represent *B. Foxii* which however, ex char., seems to be a variant. Illustrated, Knuth, l.c. *fig. 25*, page 411. F.M. Neg. 19208.

Loreto: In forest, La Victoria, *Williams 2910*. Mishuyacu near Iquitos, *Klug 183* (det. Killip). Río Mazán, *José Schunke 143* (det. Standley). Northwestern Brazil. "Ambrosocó."

Biophytum Tessmannii Knuth, Pflanzenreich IV. 130: 404. 1930.

Allied to *B. dendroides* but subacaulescent, the stems only a cm. or two high from a tortuous ligneous root to 5 mm. thick; leaflets 12–15 pairs, rectangular, the medial 17 mm. long, 6 mm. wide, retuse at base, more or less oblique at the mucronulate tip the mucro 0.5 mm. long, margins ciliate, surfaces minutely appressed pilose, the lower nearly cordate, the upper obliquely ovate; peduncles obsolete or 5 mm. long, in an apical head 5 mm. thick; bracts 3–4 mm. long, numerous; flowers often one or two, the pedicels 0.5 mm. long, glabrous as sepals, these pale or pale rose, very acute, 6 mm. long; petals 14 mm. long, oblong, white except above the middle where roseate.

Loreto: In moss and selaginella on large stones in flood-free wood, Pongo de Manseriche, (*Tessmann 4741*, type).

3. HYPSEOCHARIS Remy

Essentially acaulescent herbs with spreading pinnate leaves, or the few upper ones pinnately incised, the leaflets subentire or 3-lobulate or pinnate-incised. Peduncles cymosely 1–many-flowered, the flowers orange. Sepals and petals 5, the former imbricate, the latter contorted, glands none. Stamens 15, subtriseriate, coalescent at base. Ovary 5-lobed, 5-celled, the style one, the stigma capitate, terminal, the seeds many in each cell. Capsule loculicidally dehiscent.—The genus is not clearly a member of this family but its position is then uncertain; cf. Knuth, Bot. Jahrb. 41: 170. 1908.

Leaflets all obtusely bilobed at tip, the peduncles 1-flowered. *H. bilobata.*

Leaflets entire or minutely tricrenate-denticulate. . . . . *H. tridentata.*

Leaflets dentate or pinnately incised; peduncles 1–4-flowered. *H. pedicularifolia.*

Leaflets bipinnately incised; peduncles 5–7-flowered. . . . *H. Pilgeri.*

Hypseocharis bilobata Killip, Journ. Wash. Acad. Sci. 16: 570. 1926; 439.

Root cylindric, elongate, dark purplish, 1.5–2 cm. thick; petioles as sometimes the leaf rachis puberulent, otherwise glabrous, the former 5–10 mm. long, the latter 2–6 cm. long, with alternate or subopposite sessile or subsessile leaflets the lateral oblong-orbiculate, cordulate at base, 3–6 mm. long, 2–5 mm. wide, the terminal ovate-orbicular, obliquely cordate at base, 6–10 mm. long, 5–8 mm. wide, all shallowly bilobed at apex, the sinus to 1.5 mm. deep, the erect

lobes obtuse; peduncles slender, 1-flowered, 1.5–2 cm. long; sepals oblong, obtuse, about 4 mm. long, 3 mm. wide; ovary broadly ovoid; corolla not seen.—After author, who notes that in the similar *H. tridentata* the root is not strongly thickened and the leaflets are 3-dentate.

Cuzco: Near Cuzco, 3,000–3,600 meters, *Herrera*, type.

Hypseocharis pedicularifolia Knuth, Bot. Jahrb. 41: 173. 1908; 429.

Leaves 5–7 cm. long, the glabrous petioles broadly dilated at the fleshy base, the 13–17 pairs of leaflets alternate or opposite, sessile, very broadly ovate or obovate, 5–7 mm. long, coarsely or lobulately incised on each side, with one or often both sides also with a basal obtuse lobe; peduncles scapiform, not more than 2 cm. long, 1–2-flowered the flowers less than 3 cm. across; petals cuneately broadly-obovate, pale red (Fiebrig).—*H. Fiebrigii* Knuth, l.c. has elliptic serrate-dentate leaflets.

Arequipa: Above Chivay in heather formation, 3,900 meters, *Weberbauer 6899* (det. Knuth). Bolivia.

Hypseocharis Pilgeri Knuth, Bot. Jahrb. 41: 174. 1908; 429.

Leaves 7–11 cm. long, pinnate but toward the apex only pinnately incised; petioles glabrous, the broadly dilated bases nearly membranous margined; leaflets 13–19, alternate or subopposite, to 2 cm. long, sessile, broadly ovate, coarsely pinnate-incised the lobes more or less deeply cleft with obtuse or obtusish divisions; peduncles 5–7-flowered forming a few-flowered corymb, the flowers themselves unknown.—In Goodspeed collection "flowers white, falling very readily," the oblong obtuse sepals about 5 mm. long, nearly 3 mm. wide.

Lima: Stony places near stream between Norquinia and Matucana, 2,300 meters, *Weberbauer 95*, type; 166. Below Matucana, rock-outcrops among xerophytes, 2,300 meters, *Weberbauer 5200* (det. Knuth); 2,400 meters, *Goodspeed 33072* (det. Leonard).

Hypseocharis tridentata Griseb. Goett. Ges. Wiss. Nachr. 493. 1877 et Abh. 24: 73. 1879; 428.

Leaves 3–10 cm. long, with basally broadly dilated glabrous petioles, the margins nearly membranous; leaflets 11–17, alternate or subopposite, sessile, the lateral 5–14 mm. long, elliptic or oblong, the terminal 7–18 mm. long, ovate, all entire or with three obtusish

teeth at apex or, more accurately, emarginate with a medial mucro or tooth; peduncles 6 cm. long, 1-flowered, the flowers unknown.—*H. pimpinellifolia* Remy, 428, has 15–21 oblong-lanceolate or elliptic leaflets 2–3 cm. long, those in the upper part unequally crenate-dentate, below mostly entire, the lower trilobed to base; the leaves to 17 cm. long, the corolla to 4 cm. broad. It is possible that this, the type species, is polymorphic and the other described plants variants. Determinations mostly by Knuth. *Vargas 9722* has oblong obtuse sepals nearly 6 mm. long and about half as wide, petals 12 mm. long, nearly 6 mm. wide at the somewhat broader tip.

Huancavelica: Between Cuchicancha and Huaytará, *Raimondi.* Huancavelica, *Raimondi.*—Ayacucho: Near Cangallo, *Raimondi.*—Cuzco: At 3,400 meters, *Herrera 476.* Ocongate, 3,350 meters, *Vargas 9722.* Bolivia; Argentina.

TROPAEOLACEAE Juss. Nasturtium Family

Reference: Buchenau, Pflanzenreich IV. 131. 1902.

Scandent herbs (two Chilean species procumbent) with nearly always long-petioled often peltate leaves that are entire, lobed or divided to the petiole, and solitary axillary well-peduncled irregular showy flowers (one Ecuadorean species, *T. umbellatum* Hook., flowers umbellate). Stipules rarely conspicuous, often slender and caducous, sometimes wanting. Sepals 5, imbricate or valvate, the lateral often broader. Petals usually 5, entire to variously lobed or dentate, eciliate to fringed-ciliate; axis of sepals and upper petals produced into a straight or curved spur. Stamens 8, free; anthers bicelled, erect, laterally dehiscent. Ovary 3-celled; cells 1-ovuled; stigmas sessile, 3, papillose within. Fruit 3 spongy or rather fleshy follicles that are usually ridged dorsally.

1. TROPAEOLUM L.

The only genus, and important in floriculture since 1843 with the discovery of *T. peltophorum* Benth.; *T. minus* L. and *T. majus* L. were however popular in gardens from the middle seventeenth century, the former introduced into Germany in 1570, the latter more than a hundred years later (Buchenau). Hybrids, particularly of these species, adorn the gardens of the world as "Nasturtiums." Only about a dozen species, at one time and another, have been in cultivation.

The buds and immature fruits of *T. majus* and other species, cured in vinegar, are used as a substitute for capers. The latter especially suggest the caper pickle (flower bud of the African *Capparis spinosa*) in shape and are pleasant as well as peppery in taste; Ruiz and Pavón also found "people of refinement adding the flowers to salads which attain a not unpleasant flavor." The tubers of *T. tuberosum*, cooked, are much appreciated in the middle and higher Andes; cf. note under that species.

Besides the following, Buchenau recorded *T. ciliatum* R. & P., 20, from Peru on the basis of a Dombey specimen without exact locality; since the species is today unknown except in Chile this is doubtless another of the Dombey specimens mislabeled. In compiling this account, from Buchenau, l.c. and D. K. Hughes, "serrato-ciliata" group, Kew Bulletin 63–85. 1922, I have become impressed with the late Stapf's remark in his foreword to the latter's paper: "The range within which the characters used for discrimination actually vary, and consequently their reliability and perhaps even the claim of some of the units recognized to the status of species remain open questions. Observations in the field and cultivation both have to be called in aid to answer them." It is probable that there is hybridization in the field as in the garden and a taxonomic study with the aid of genetics is very much in order. Kuntze used the name *Trophaeum*, the resulting synonyms not cited here as his action now seems clearly to be only of historical interest. My friend Killip has added to the cited specimens from the collections in his charge (nearly all determinations were made or verified by him), and his assistance in the disposal of critical material is gratefully acknowledged.

Petals at least in part lobed, serrate- or aristate-ciliate, sometimes not exserted (cf. *T. minus*, lower at least ciliate apically).

Leaves more or less deeply 5–7-lobed.

Leaf-lobes extending distally at least half way; stipules subulate and parted, often caducous; sepals sometimes gibbous at base.

Petals lobed, at least the upper.

Lobes of upper petals obtuse, eciliate.

Plants glabrous; leaf-lobes obtuse; petals irregularly lobed..... *T. peregrinum.*

Plants sparsely pilose; leaf-lobes acute; petals 3-lobed. *T. Seemanni.*

Lobes of petals narrow, 3, dentate-aristate. . *T. Haynianum.*

Petals not lobed, puniceous ciliate..... *T. Smithii.*

Leaf-lobes extending less than half way; stipules rather semilunate; petals serrate-ciliate; sepals partly gland-appendaged at base..... *T. bicolor.*

Leaves entire to angulately lobulate, rarely 3-lobed.

Stipules none, minute or caducous.

Leaves entire to angulate; spur straight or merely curved.

Leaves longer than or about as long as broad; flowers usually 3.5–4.5 cm. long.

Leaves glabrous, often somewhat papillose beneath. *T. cirrhipes.*

Leaves sparsely pubescent above, pruinose-papillose beneath..... *T. papillosum.*

Leaves distinctly broader than long; flowers to 2 cm. long. *T. olmosense.*

Leaves obtusely but obviously 3-lobed; spur coiled at tip. *T. Weberbaueri.*

Stipules conspicuous, persisting; leaves papillose beneath. *T. Matthewsii.*

Petals entire, emarginate or obscurely to coarsely crenulate or the 3 lower ciliate basally (rarely apically, *T. minus*), rarely wanting.

Leaves more or less deeply 5–7-lobed; petals eciliate basally.

Leaves pedately parted; petals 2, the 3 lower wanting. *T. dipetalum.*

Leaves distally lobed, peltate; petals 5.

Flowers 4–5 cm. long; leaves nearly medially 7-lobed with rounded open sinuses between the obovate lobes. *T. longiflorum.*

Flowers to 4 cm. long; leaves rarely 7-lobed (to 7-parted), but not as above.

Flowers red and orange, tubular-funnelform, the throat about 1 cm. wide at anthesis; petals typically entire; roots tuberous, perennial; leaflets about one-third 5-lobed..... *T. tuberosum.*

Flowers broadly funnelform, 1–2 cm. wide; petals in part 1–3-crenate; roots (known) annual; leaflets often 6–7-lobed.

Petals yellow-red or orange; leaves often 5-lobed. *T. crenatiflorum.*

Petals purple or violet; leaves often 6–7-lobed.

Flowers 2–2.5 cm. long..... *T. purpureum.*

Flowers 3–3.5 cm. long..... *T. Vargasianum.*

Leaves very shallowly lobed, subentire or entire; petals at least lower 3, ciliate or fringed basally.

Flowers conic-tubulate, the lower petals coarsely crenate, ciliate at base..... *T. peltophorum.*

Flowers open funnelform, the lower petals often ciliate apically, all fringed at base.

Leaf-nerves and petals not mucronulate..... *T. majus.*

Leaf-nerves and petals mucronulate but sometimes minutely or caducously..... *T. minus.*

Tropaeolum bicolor R. & P. Fl. Peruv. 3: 76. *pl. 313.* 1802; 22.

Rather stout, glabrous, high-climbing with firm semilunate acute incised-ciliate stipules and peltate nearly truncate-based leaves parted to two-fifths into 7 broadly (ovate) oblong shortly mucronate lobes; peduncles two to three times longer than the leaves; lower petals a little longer than the sulphur yellow calyx, the smaller upper ones yellow the larger lower puniceous-red, all serrate-ciliate; spur yellow, straight, cylindric-conic, 43 mm. long above, 6 mm. thick at base; filaments purplish, anthers violet; lower petals eciliate on claw; sepals obtusish, the lower gland-appendaged at base, 15–18 mm. long; leaves slightly paler beneath to about 5 or 7 cm. wide, 3.5–5.5 cm. long; lower petals about 15 mm. long, the upper about 13 mm.—Name originally *bicolorum.* F.M. Neg. 12664.

Huánuco: In the mountains near Muña, *Ruiz & Pavón,* type. In thickets at Tambo de Vaca, *4422.*—Junín: above Tarma, *Ruiz & Pavón.* Río Masamerich, *Weberbauer 6636;* also *6724.* Concepción to Satipo, 1,800 meters, *Seibert 2382.*

Tropaeolum cirrhipes Hook. Icon. Pl. 5: *pl. 411.* 1842; 23.

Glabrous except for the hirsutulous nodes; stipules minute or caducous; stems angled and sulcate; petioles curved or cirrhose, to 11 cm. long; leaves long-ovate, but distinctly peltate, entire but subrepand at base, the basal angle rounded, obtuse at tip, to 9 cm. long, 5–6 cm. wide at base, glaucous and minutely or obscurely pruinose-papillose beneath; pedicels strongly cirrhose, to 2 dm. long,

slightly enlarged below the flowers, these 4.5 cm. long, the red spur 3.6 cm. long, 4 mm. thick at base, obtuse; sepals green, rounded-ovate; petals not exserted, 4–5 mm. long, dentate-ciliate above, yellowish-green.—*T. menispermifolium* Buch., Bot. Jahrb. 34: Beibl. 78: 11. 1904, has leaves slightly broader than long, densely pruinose-papillose beneath, pedicels a little pubescent, flowers about 5 cm. long; the Bolivian *T. Kuntzeanum* Buch., 23, more resembles *T. cirrhipes* but has leaf-angles obtuse instead of rounded, pedicels 7–10 cm. long, flowers 5–5.5 cm. long; *T. cuspidatum* Buch., 23, likewise of Bolivia, differs from all of these species, which it in general resembles, by the obscurely or not at all peltate leaves.

Amazonas: Chachapoyas, (*Matthews 3177*, type).

Tropaeolum crenatiflorum Hook. f. Bot. Mag. 72: *pl. 4245.* 1846; 20.

Annual from fusiform root; stipules subulate, deciduous; leaves reniform-suborbicular, peltate, straight or a little repand at base, 5-lobed about one-fourth (rarely some leaves 6- or 7-lobed), the obtuse segments mucronate; peduncles very slender, far exceeding the leaves; flowers 3–4 cm. long; sepals ovate, acute; spur about 15 mm. long above, nearly cylindric, 4 mm. thick at base, abruptly acuminate; petals entire or the upper merely repand, pale yellowish red, red-lined, the longer lower orange-yellow, clawed, eciliate, somewhat bicrenate.—Similar species included the Bolivian *T. cochabambae* Buch., 20 (this fide Buchenau probably with earlier name, *T. Klotzschii* Warscewicz), and the Ecuadorean *T. Buchenavianum* Hieronymus, 21 (not, it may be noted, invalidated by *T. Buchenavii* Phil., the different ending sufficing according to the International Rules; *T. Hieronymi* Buch., 21, is therefore a superfluous name); both species are distinguishable from *T. crenatiflorum* by the smaller flowers (20–24 mm. long); the first is very slender with many orange flowers, petals undulate-sinuate, the upper with a dark velvety spot; the petals of the second are carmine, entire, or obscurely crenulate. *T. septemlobatum* Heilb. (cf. under *T. purpureum*) of Ecuador is very near but petals entire, more red, spur about 2 cm. long, 5–6 mm. thick at base, leaves regularly 7-lobed.—Illustrated, Fl. Serres 2: *pl. 166.*

Huánuco: Near Pillao, *Lobb*, type. Near Chaglla, *Lobb.* Cani, *3484.*—Huancavelica: Ampurco, 2,600–2,700 meters, *Weberbauer 6501.*—Cuzco: Below Lares, Prov. Calca, *Weberbauer 7896.*

Tropaeolum dipetalum R. & P. Fl. Peruv. 3: 77. *pl. 313.* 1802; 18. *Chymocarpus stipulaceus* Klatt ex Otto, Hamb. Gart. & Blum. Zeit. 259. 1859.

Distinctive by the conspicuously large 3-lobed stipules, these deciduous, and the red flowers that lack the 3 lower petals; leaves broadly spathulate, 5–7-lobed, the obtuse lobes mucronate; petals cuneate; spur slender, slightly curved, 28–30 mm. long above, cylindric; calyx persisting at base of the fleshy fruit.—Leaves firm, with 7 sometimes irregular or lobulate lobes that extend below the middle, deeply cordate at base, epeltate, to 7 cm. wide, about 4 cm. long; petioles 8–10 cm. long; peduncles about 16 cm. long; spur about 2 cm. long, sepals and petals nearly as long.—Illustrated, Kerner, Hortus Sempervirens 21: *pl. 252.* F.M. Neg. 12668.

Huánuco: Wooded places in the mountains of Pillao, *Ruiz & Pavón*, type. "Monte-massua."

Tropaeolum Haynianum Bernhardi, Allg. Thuer. Gartenz. 2: 73. 1843; 25.

Glabrous, without stipules and the petioles little longer than the nearly three-fourths acute or acuminately 5-lobed leaves, the blade repand at base, the lobes often incised; flowers 30–33 mm. long, the spur about 2 cm. long above, curved, subulate-acuminate, 4.5 mm. thick at base, yellow and red-dotted or -lined as the ovate acute sepals, these shorter than the deeply ciliate-incised 3–more lobed petals, the larger upper ones orange yellow or scarlet toward edges or dotted or striped, the smaller lower ones yellow and less dotted. —The narrow lobes of the petals merge with the capillary or ciliate teeth, which much exceed the primary divisions. The flowers are often only 28 mm. long; the spur is extremely slender toward the tip.—Illustrated, Buchenau, 26 (petals). F.M. Neg. 18268.

Huánuco: Apparently described from cultivated specimens, origin near Huánuco.—Cuzco: Echarate, Prov. Convención, sunny edge of forest, *Goodspeed Exped. 10498* (det. Standley). Lares Valley, Prov. Calca, *Weberbauer 7942.*

Tropaeolum longiflorum Killip, Journ. Wash. Acad. Sci. 24: 48. 1934.

Entirely glabrous; stipules linear, coriaceous, subpersisting, about 3 mm. long; petioles 3–4.5 cm. long; leaves peltate, 7-lobed nearly to middle, 2–3 cm. long, 2.5–4 cm. wide, lobes obovate, to 1 cm. wide, rounded and minutely callose-mucronulate, papillate

beneath; peduncles 12–13 cm. long; flowers 4–5 cm. long, spur cylindric, 3.2–3.5 cm. long, about 3 mm. thick, conspicuously nerved, tip straight or slightly curved; sepals oblong, obtuse, 8–10 mm. long, 3–5 mm. wide; petals similar and subequal, 13–15 mm. long, 6–9 mm. wide, subtruncate, subentire, the 2 upper ones scarlet, the 3 lower orange with scarlet veins, all with dark brown veins at base.—Leaves general outline of *T. septemlobatum* Heilb. of Ecuador and *T. purpureum* but lobes obovate, flowers much larger and petals more nearly uniform; leaf-shape and size of flower that of *T. bicolor* of the serrato-ciliata group (Killip).

Junín: Near Atax, 3,400 meters, Río Masameric, *Weberbauer 6641*, type.

Tropaeolum Matthewsii Hughes, Kew Bull. 69. 1922.

Young parts (as to type) more or less ashy villous-puberulent, the slender stems somewhat compressed and contorted toward the tips; stipules persisting, semiorbicular, to 1 cm. wide, entire or essentially, like the leaves scarcely papillose above, pruinosely so beneath; petioles subcirrhose, nearly 3 cm. long; leaves broadly triangular-ovate, 2.5–3 cm. long and wide or a little wider, broadly 5-lobed, the lobes emucronate; pedicels cirrhose, scarcely exceeding the petioles; flowers sparsely pubescent, to 2.5 cm. long, spur straight, conic, 1–1.8 cm. long, about 4 mm. thick at base; sepals broadly ovate-oblong, rounded-obtuse, nearly 8 mm. long, 5–6 mm. wide; petals not at all exserted, dentate-ciliate above, the upper broadly spathulate-oblong, 6 mm. long, lower obovate, attenuate to claw, 4 mm. long.—Nearly *T. stipulatum* Buch. & Sod., Bot. Jahrb. 34: Beibl. 78: 12. 1904, of Ecuador, stems and petioles sparsely spreading hirsute to glabrous, stipules 1 (rarely 2–3) cm. wide, leaves epapillose, glabrous, nerves beneath red, and more or less red punctate; flowers glabrous, 2.5–3 cm. long, spur 18–22 mm. long, entirely red, petals dark red, after Heilborn, Arkiv. Bot. 23A, pt. 9: 7. 1931.—Illustrated, Hughes, l.c. 70.

Amazonas: Chachapoyas, (*Matthews*, type).—Libertad: Mixiollo, 2,900 meters, *Weberbauer 7034* (det. Mansfeld).

Tropaeolum majus L. Sp. Pl. 345. 1753; 21.

Like *T. minus* but coarser, the leaves orbicular and the nerves as the petals not mucronulate; spur barely curved, 26–28 mm. long above, 3–4 mm. thick at base; petals orange or red to yellow, the lower obscurely if at all spotted.

This is the popular cultivated "nasturtium" or at least the source in hybridization usually with *T. minus* or *T. peltophorum.* The Worth and Morrison collection suggests the latter in pubescence but has the petals of *T. majus.* Its *tallos* are used to dye yellow (Herrera); its buds and young fruits pickled; its flowers used in salads (Ruiz & Pavón, who found it at Lima, Chancay and Huánuco).

Lima: Wet places near Barranco, Weberbauer, 148. Near Lima, *Wilkes Exped.* Pueblo Libre, *Soukup 2573,* fide Killip.—Arequipa: Granite slides, Chalca, 300 meters, *Worth & Morrison 15680* (det. Johnst.). At Arequipa, *Soukup 991.* Without data, Ruiz & Pavón.—Cuzco: Near Yucay, 3,000 meters, *Herrera 1459.* Peru to Colombia. "Mastuerzo," "mastuercillo" (Ruiz & Pavón).

Tropaeolum minus L. Sp. Pl. 345. 1753; 21.

Nearly glabrous vine similar to *T. peltophorum;* leaves orbicular-reniform, the nerves terminating (sometimes obscurely) in mucronate points; spur usually obviously curved; petals mucronulate, the lower ciliate apically and with a conspicuous darker blotch.—*T. pinnatum* Andrews, Bot. Rep. 8: *pl. 535.* 1808 vel 1809, is said to be a hybrid of this and *T. peregrinum* L.; garden forms are usually hybrids of this and *T. majus* L. The native plant has citrus or golden yellow petals, the upper ones red-veined but the lower with a large brownish-red spot; like the similar *T. majus* L. the first two leaves are opposite, one-third 3-lobed, and have white-tipped linear-subulate stipules, rose-tinted at base, a tone that streaks the young stem and the younger leaf-nerves.—Material from Cerro de San Agustín is not clearly referable to this or *T. majus* and maybe it could be noted as a variant since the leaves are obscurely mucronulate, the flowers scarcely 2.5 cm. long, but probably it is only a local race of one or the other of the similar species.—Illustrated, Bot. Mag. 3: *pl. 98.*

Cajamarca: Near Cascas, *Raimondi.*—Ancash: Huaráz, *Raimondi; Weberbauer 3220* (det. Loesner). Pampa Romas, *Weberbauer 3199* (det. Loesner).—Lima: Moist places, *Feuillée.* Lomas of Lima, covering large areas, flowers yellow, *Verne Grant 7439.* Near Viscas, *Pennell 14477; Soukup 2572.* Cerro de San Agustín, *Weberbauer 5716.*—Ayacucho: Huanta, 2,800 meters, *Killip & Smith 23341.*

Tropaeolum olmosense Mansf. Notizbl. Bot. Gart. Berlin 9: 52. 1924.

Stem nodes puberulent as also petioles (about 6 cm. long) and peduncles or the last two glabrescent; stipules none; leaves broadly

deltoid, broader than long, entire or subrepand-sinuate, very shortly apiculate, about 3 cm. long, 5 cm. wide; peduncles to 6 cm. long; spur conical, crimson, about 16 mm. long upper side, lower 14 mm. long, 4 mm. thick at base, puniceous; petals yellow, serrate-ciliate, the upper with a brown spot, little exceeding the red sepals, the lower also ciliate above on the claw and about twice as long as the sepals.—Near *T. Moriztianum* Klotzsch of Colombia and northwards (Mansfeld), with suborbicular leaves, orange petals, a species not placed by Miss Hughes in her revision (under direction of Stapf) Kew Bull. 63–85. 1922 of species 14–29 of Buchenau's treatment, a curious omission, indeed, for Buchenau, Bot. Jahrb. 34: Beibl. 78: 11. 1904, indicated that its upper petals are in reality serrate-ciliate. *T. repandum* Heilb. Arkiv. Bot. 23A, pt. 9: 5. 1931, of southern Ecuador, has larger flowers, scarcely exserted petals, even the calyx red.

Lambayeque: Above Olmos, 1,100 meters, in stream brush, *Weberbauer 7098*, type.—Piura: Chanchaque, Huancabamba, 1,250 meters, *Stork 11410*.

Tropaeolum papillosum Hughes, Kew Bull. 71. 1922.

Glabrous, the slender striate stems subcompressed and contorted, the stout petioles somewhat enlarged below and cirrhose, to 4 cm. long; stipules not apparent; leaves broadly rotund-ovate, subentire, 6.5 cm. long and broad, green and red-punctate, as well as papillose and sparsely pubescent above, glaucous, obscurely mottled and densely pruinose-papillose beneath; pedicels very slender, scarcely cirrhose, to 7 cm. long; flowers glabrous, nearly 3.5 cm. long, the straight abruptly attenuate spur 2.5 cm. long, 4 cm. thick at base; sepals ovate; petals dentate, not at all exserted, 4.5 mm. long, the upper spathulate-oblong, long-ciliate, the lower clawed, smaller, shortly ciliate.—The illustration, l.c. 72, shows both lower and upper petals with cilia equally long and about as long as the blade. *T. pubescens* HBK., 25, of Colombia and Ecuador and to be expected, has pubescent flowers 2–2.5 cm. long, petals violet, leaves, at least early, pubescent, as well as papillose; other Ecuadorian species that might be sought here include *T. fulvum* Buch. & Sod., Bot. Jahrb. 34: Beibl. 78: 11. 1904, and *T. adpressum* Hughes, l.c. 80, illustrated, 84; both have pubescent leaves, punctate or mottled with red, but epapillose and hirsute flowers, these (3) 4.5–5 cm. long, leaves of former long-ovate, subentire, of the latter, broadly ovate, subtrilobed. Another Ecuadorian species, similar if not related, is *T. glaucum*

Heilb. Arkiv. Bot. 23A, pt. 9: 4. 1931, flowers 4–5 cm. long, leaves 5-angulate-lobed, truncate at base.

Peru(?): Tambo grande (Huánuco?), *André.* Ecuador.

Tropaeolum peltophorum Benth. Pl. Hartw. 127. 1843; 21. *T. Lobbianum* Veitch, Bot. Mag. 70: *pl. 4097.* 1844.

More or less pubescent (rarely glabrous) fusiform rooted annual or perhaps sometimes perennial with peltate entire or merely repand suborbicular mucronate or nearly aristate-tipped leaves often 3.5 cm. across and rather large (about 3 cm. long) flowers, their lower petals coarsely crenate-dentate, ciliate at base, orange or scarlet; sepals ovate, obtusish, somewhat ciliate, spur cylindric-subulate, subcurved, 3–4 mm. thick at base, 2.5–3 cm. long above.—Upper petals large, nearly entire. *Weberbauer 6414* seems to be referable here and may be named var. **calvum** Macbr. var. nov., foliis glabris ad 8 cm. latis, circa 7 cm. longis, petalis haud ciliatis.—Probably scarcely worthy a name since, as Killip has called to my attention, there are already four variants named in Bailey's Cyclopedia of Horticulture, which however are unknown to me. *T. huigrense* Killip, Journ. Wash. Acad. Sci. 19: 194. 1929, of Ecuador has yellow flowers, spur 1 cm. long, 1.5 mm. thick at base.—Illustrated, Fl. Serres 2: *pl. 3.* F.M. Neg. 26392.

Piura: Huancabamba, 1,900 meters, *Weberbauer 6060.* Hacienda Lagunas, Prov. Ayavaca, *Weberbauer 6414* (type, var. *calvum*).—Libertad: *Raimondi.* Ecuador; Colombia.

Tropaeolum peregrinum L. Sp. Pl. 345. 1753; 27.

Allied to *T. Haynianum;* leaves weakly peltate, the base indented or scalloped, the upper part regularly 3–7-lobed, the middle lobes often on both sides (the others on one side) 1-lobate, the lobes mostly obtuse but often mucronate; peduncles shorter than the leaves; sepals obtuse; upper petals broadly spathulate to nearly round, stiped, irregularly lobate-incised, the lobes usually obtuse, the lower petals long-stiped, narrowly cuneate, laterally 4 or 5 aristate-capillate, all longer than the calyx, sulphur or lemon yellow, the upper red-dotted near base, to 17 mm. long, 12–14 mm. wide, calyx and spur greenish-yellow, the latter 12 mm. long above, 5 mm. thick at base, pyramidate, strongly curved at end.—Illustrated, Buchenau, 26 (petals); Bot. Mag. 33: *pl. 1351;* Bot. Reg. 9: *pl. 718.* Cultivated and used in medicine according to Herrera. Found at Lima, Chancay and Huánuco by Ruiz & Pavón.

Lima: Near Lima, (*Feuillée*). San Rafael, *3134*.—Huánuco: Ambo, *3172* and Mito, *3275*.—Junín: Tarma, 3,054 meters, *Stork 10946* (det. Standley). La Oroya, *Kallenborn 158*. Near Tarma, *1039; Killip & Smith 21774*.—Apurímac: Chincheros, 2,500 meters, yellow with purple spots, *West 3687; Stork & Horton 10728* (det. Standley).—Cuzco: Saxaihuamán, *Pennell 13566*. Huilabamba, 4,000 meters, *Balls 6792*. Urubamba, 2,860 meters, *Vargas 11088* (det. Standley). Near Cuzco, *Herrera 826; 245*. Prov. Cercado, (*Herrera 49*). Ollantaytambo, 3,000 meters, *Cook & Gilbert 402*. Sicuaní, *Cook & Gilbert 96*. Huasao, *Herrera 708*. Bolivia. "Paxjarito," "malla" (Feuillée), "huallpa-huallpa" (Herrera), "quitaaño" (West), "añu-añu" (Herrera).

Tropaeolum purpureum Killip, Journ. Wash. Acad. Sci. 24: 48. 1934.

Glabrous; stipules linear-subulate, 1–1.5 mm. long, soon deciduous; petioles 3–6 cm. long; leaves peltate, 2.5–4 cm. long, 3–4.5 cm. wide, 7-lobed, the lobes rounded or truncate, mucronulate, epapillose, glaucous beneath; flowers 2–2.5 cm. long, spur brown-red, cylindric-conic, about 12 mm. long, 3.5 mm. wide, tip slightly curved, petals a little clawed, crenate at tip, purple, 5–6 mm. wide, the upper about 1 cm. long, lower 1.5 cm. long.—Nearest *T. crenatiflorum* Hook. f. and *T. septemlobatum* Heilb. Arkiv. Bot. 23A, pt. 9: 9. 1931 of Ecuador but flowers purple and, as to the former, with 5-lobed much smaller leaves; from the latter it differs further in the crenate petals (Killip).

Cuzco: Near Marcapata, 3,200 meters, *Weberbauer 7788*, type; *Vargas 9667* (det. Standley, *T. minus*).

Tropaeolum Seemanni Buchenau, Bot. Jahrb. 15: 226. 1892; 28.

Allied to *T. peregrinum* but sparsely pilose; leaves long-petioled, peltate, 3–5-lobed the oblong lobes entire or lobulate, rather acute, mucronate; petals all orange, clawed, flabellate-spathulate, the upper to about three-fourths trilobed, these lobes shortly and obtusely 3-lobulate, lower petals stiped, about medially trilobed, the lobes 3–more serrate-ciliate; flowers about 3 cm. long, the peduncles longer than the leaves, spur straight, conic-subulate, 15 mm. long above and below, 3 mm. thick at base; sepals acute, much shorter than the orange petals.—Illustrated, Buchenau, 26 (petals).

Lima: In gardens, (*Miers*).—Arequipa: In maize fields, (*Markham; Cook & Gilbert 61*). Near Arequipa along irrigation ditch, *Pennell 13046* (det. Killip). Bolivia.

Tropaeolum Smithii DC. Prodr. 1: 684. 1824; 22.

Resembles *T. bicolor* but with thin subulate 2–3-parted stipules and leaves divided about three-fourths into 5 acute, sometimes incised lobes; sepals acutish, gibbous-appendaged; calyx and spur scarlet, this 2 mm. thick at base, subcurved, about 18 mm. long, the abruptly attenuate tip green; petals orange, puniceous-ciliate, about one and a half times longer than sepals, with red veins and red-tipped cilia.—Illustrated, Bot. Mag. 74: *pl. 4385;* Fl. Serres, 4: *pl. 384.*

Libertad: Parcoy, 3,200 meters, *Weberbauer 7084* (det. Mansfeld). To Colombia and Venezuela. "Pajarito."

Tropaeolum tuberosum R. & P. Fl. Peru. 3: 77. *pl. 314.* 1802; 28.

High-climbing, glabrous, the often red-tinged stems (as petioles, peduncles) from whitish-yellow usually red-marked obconic or pyriform tubers that are sometimes 8 cm. long; stipules subulate, deciduous; leaves repand at base, nearly orbicular-peltate, about one-third 5-lobed, the rounded or very obtuse lobes mucronate; peduncles usually definitely exceeding the leaves; spur red, rather thick, cylindric-subulate, slightly curved near the tip, about 2 cm. long, 3.5 mm. thick at base; sepals broadly ovate, obtuse, red, slightly shorter than the entire orange or reddish petals, the upper of these nearly orbicular the lower narrower.—Other tuberous species are probably Chilean except it may be noted that Buchenau, without data, suggested that *T. azureum* Miers, 31, and *T. tenuirostre* Steud., 33, may be found within Peru; both have small tubers, the leaves divided to the base; the first has short spur, blue petals, the second, conical spur, broad opening, yellow petals. Illustrated, Buchenau, 30 (petals); Hooker, Icones 7: *pl. 653;* Fl. Serres 5: *pl. 452.*

Commonly cultivated for the sweetish edible tubers for which Herrera recorded the following native names which refer to the variety in color: "occe-añu, yana-añu, puca-añu, chchecche-añu, yurac-añu, ckello-añu, sapallu-añu, muru-añu." An interesting account of Añu and Oca (*Oxalis tuberosa*) with plates is given by W. H. Hodge in Journ. N. Y. Bot. Gard. 47: 214–224. 1946.

Lima: Huariaca, *3097.* Valley Río Rímac, 3,400 meters, *Goodspeed Exped. 33132.* Río Blanco, *2975; Killip & Smith 21575.* Matucana, *123; 402.*—Ayacucho: Prov. Lucamas, 2,800 meters, *Metcalf 30299.*—Huánuco: Tambo de Vaca, *4423.*—Junín: Tarma, *Killip & Smith 21913.*—Apurímac: Río Incabamba, 3,000 meters,

Stork & Horton 10731 (det. Standley, *T. Matthewsii*).—Cuzco: Valle del Vilcanota, 3,500 meters, (*Cook*). Prov. Cercado, 3,450 meters, near Urubamba, *Vargas 11087* (det. Standley, *T. Matthewsii*). Valle de Paucartambo, 3,500 meters, (*Herrera 482*). Below Lares, *Weberbauer 7886*. Apurímac Valley, *Herrera 3063*. Sicuaní, *Cook & Gilbert 194; 230*.—Puno: near Limbani, 3,200 meters, *Metcalf 30484*. Ecuador; Bolivia. "Massua" (Weberbauer), "mashua" (Sodiro), "añu" and "apina-mama" (Herrera), "mayua."

Tropaeolum Vargasianum Soukup, Diez Años Serv. Bot. Univ. Cuzco 50: *pl. 17*. 1946.

Ex char. similar to *T. purpureum* except flowers 3–3.5 cm. long, spur 13–15 mm. long, 4 mm. wide at throat, sepals oblong, about 6 mm. long, 4–5 mm. wide, petals 1–3-crenulate or subdenticulate (according to plate), the upper 7 mm. long, 6 mm. wide, the lower about twice as long and approximately 8 mm. wide, all very broadly spathulate and slightly clawed.—The author does not state if the leaves are papillose but apparently they are larger than those in type of *T. purpureum*, described 3–3.5 cm. long, 34–48 mm. wide; they are nearly truncate at base, one-fourth to one-fifth 6–7-lobed (one leaf in plate with only 5 lobes).

Cuzco: Near Quellomayo, 3,200 meters, Panticala to Lucumayo, (*Vargas 4826*, type, Herb. Univ. Nac. Cuzco).

Tropaeolum Weberbaueri Loesner, Bot. Jahrb. 45: 462. 1911.

Branchlets, petioles (to 6 cm.) and peduncles (to 4.7 cm.) under a lens more or less viscid pilose; leaves peltate, 3-lobed but 5-angled-obtruncate, basal angle rounded, lobes acuminate-mucronate, acutely angled; flowers solitary, narrowly infundibuliform, 26–30 mm. long, spur about 15 mm. long, 3 mm. thick at base; sepals lanceolate-elliptic, obtusish, the petals scarcely two times longer, lemon-yellow, the upper flabellate, lobate-incised, the lobules obtuse, lower linear-cuneate, long-stiped, apically long-ciliate or subaristate-fimbriate.—Affine *T. peregrinum* L. with leaves deeply 5-lobed (Loesner) but remarkable as spur is coiled at tip, upper petals reflexed. *T. flavipilum* Killip, Journ. Wash. Acad. Sci. 19: 192. 1929, of Colombia would key here but is like *T. adpressum* (cf. under *T. papillosum*) but leaf-lobes rounded, flowers 5.5 cm. long, petals deep purple, indument dense, yellowish. F.M. Neg. 12684.

Cuzco: Valle Urubamba in evergreen shrubs near Torontoy, 2,100 meters, *Weberbauer 5065*, type; also *6547*.—Huánuco: On shrubs at Muña, *4343*.

LINACEAE [DC.] Dumort.

Humiriaceae Juss.

Various in most characters including habit, thus annual herbs to trees, erect or climbing but the leaves simple, entire to toothed, usually alternate. Stipules variously developed or lacking. Pubescence usually simple, 1-celled trichomes. Flowers perfect, the calyx and corolla ordinarily in 5's, the former usually persisting, the latter caducous, sometimes appendaged. Stamens as many as petals, often more numerous, all fertile or the epipetalous staminodal, the filaments more or less united; anthers versatile. Disk lacking or interstaminal, free or attached to tube, or extrastaminal, forming a ring attached to tube. Ovary sessile, cells same number as petals, 2 or 3 often with more or less developed septa. Styles free or more or less united. Ovules mostly 2 and pendulous from apical inner angle. Fruit a capsule often dividing into as many parts as cells, a 1-seeded drupe or sometimes fleshy, with 1 seed.—A very ancient family therefore now with many gaps and the sequence of the undergroups not discernible (Winkler).

Flax, *Linum usitatissimum*, one of the most ancient of cultivated plants, is no longer known "wild" or native.

Stamens as many as petals; herbs, sometimes woody toward base. 1. *Linum.*

Stamens 2–several times as many as petals; shrubs or trees.

Styles 3–5; stamens 10–15.

Styles 5; stigmas small; petals appendaged.....2. *Hebepetalum.*

Styles 3; stigmas large; petals unappendaged.....3. *Roucheria.*

Style 1; stigmas 10, 20 or many.

Stamens 10–20; sepals nearly free.

Ovules 1 in each cell; anthers globose, 2–4-celled. 4. *Sacoglottis.*

Ovules 2 in each cell; anthers 2-celled.....5. *Houmiria.*

Stamens 50–180; sepals more or less connate; anthers 4-celled. 6. *Vantanea.*

1. LINUM [Tourn.] L.

Reference: Planchon, Lond. Journ. Bot. 6: 588–603. 1847; 7: 165–186, 473–501, 507–528. 1848.

Annual or perennial herbs or the latter often ligneous toward base, sometimes shrubby, the sessile usually alternate often narrow

leaves with 1–several parallel nerves. Stipules glanduliform or lacking. Flowers various in color, solitary or often disposed dichasially, or racemose. Sepals and petals 5, the former entire or fimbriate or glandular, the latter fugacious. Stamens more or less connate, 5, and with minute or setiform staminodia and with 5 nectar glands. Ovary 5 (2)-celled, 2 ovules to each cell. Styles 5 (2), sometimes more or less cohering or connate to the middle, rarely to the tip. Fruit a capsule with ordinarily five 2-seeded imperfectly septate cells. —There is no modern study upon which to draw the following compilation of the species reported for Peru; it is possible that earlier names given to species in Ecuador and Chile if not North America may prove to refer to the same plants. Fruiting material may simulate *Hypericum* with pellucid-puncticulate leaves.

Petals shorter than the sepals.....*L. selaginoides.*

Petals longer than the sepals.

Flowers large, blue (except white color form); leaves several cm. long.....*L. usitatissimum.*

Flowers yellow or white; leaves 1–2 cm. long, rarely some of them a little longer.

Stems minutely scabrous-glandular; annual (biennial?). *L. parvum.*

Stems glabrous or obscurely scabrous; more or less ligneous-based perennials, or even shrubby.

Styles connate to tip; basal leaf glands soon callose. *L. Macraei.*

Styles free, connate at base or more or less cohering, especially below the middle; species poorly understood or variable, the following key arbitrary, ex char.

Leaves to 1 mm. wide; pedicels to 8, seeds to 1 mm. long; tufted alpine.....*L. andicolum.*

Leaves (1)1.5–3.5 mm. wide; plants soon lax or shrubby; seeds of *L. Weberbaueri* 1.2 mm. long.

Pedicels 6–12 mm. long; middle leaves in type 1–1.5 mm. wide.....*L. Weberbaueri.*

Pedicels finally at least in part somewhat longer than calyx; larger leaves 2–3.5 mm. wide..*L. prostratum.*

Linum andicolum Krause, Bot. Jahrb. 40: 278. 1908.

Perennial glabrous herb rarely attaining 10 cm., the many stems divergent from a common base, often decumbent, simple, or sparsely

branched, striate; leaves approximate, persisting, alternate or the lower opposite, 1-nerved, linear or linear-lanceolate, shortly acuminate, with a pair of globular purplish glands at the subacute base, the intermediate 4–6 mm. long, scarcely 1 mm. wide, much longer than the internodes; flowers terminal and solitary or 2–3 in cincinni; pedicels slender, erect, 3–8 mm. long; sepals broadly ovate, longish acuminate, 3–5-nerved but the lateral nerves often obscure, 3–3.5 mm. long, nearly 2 mm. wide; petals obovate, subacute or obtuse, gradually narrowed to base, many nerved, 7–8.5 mm. long, nearly 5 mm. across above, yellow; staminodia small; staminal tube hardly 1 mm. long, with linear acute teeth little shorter between the filaments, these filiform, dilated below, about 3.5 mm. long, the oblong anthers obtuse, lightly sagittate at base, 1–1.2 mm. long; styles slender, erect, connate below, 4–4.5 mm. long, stigmas capitellate; capsule subglobose, little longer than the calyx, about 3.5 mm. broad, the compressed ellipsoid seeds somewhat curved, reddish, to 1 mm. long, scarcely 0.5 mm. broad.—Perhaps is a young tufted early flowering state of *L. prostratum*. In habit recalls *L. Chamissonis* Schiede, Linnaea 1: 69. 1826 but that species with no conspicuous leaf glands (Krause); but this character in all species in Peru seems to vary. F.M. Neg. 18010.

Junín: Grass steppes south of Tarma, 3,300–3,700 meters, *Weberbauer 2407*, type; 182.

Linum Macraei Benth. Bot. Reg. 16: sub. *pl. 1326*. 1830; 489.

Glabrous, shrubby below, the virgate or somewhat branching upper stem herbaceous, striate, often 3–4 dm. long; lower leaves crowded, 10 mm. long, 2 mm. wide, intermediate and upper narrowly linear-lanceolate or subulate, rigid, pungent, opposite or alternate, 10–16 mm. long, 3–4 mm. wide; pedicels about 5 mm. long to twice as long in fruit; sepals ovate, acutely acuminate, margins glandular; petals twice as long as the calyx equaled by the style, this completely connate to the quinfid apex; stigmas globose; capsule mucronate by the style base.—The Peruvian plant, scarcely distinct, may be designated *L. Macraei* forma **peruviana** Macbr., forma nov. foliis ad basin bicalloso-glandulosis floralibus alternis; sepalis haud glandulosis obscure fimbriatis. According to Planchon, l.c. the leaves of *L. Macraei* are eglandular at base but apparently, if one may judge from modern materials referred here, the character is variable. Specimens from Arequipa placed in this work with doubt in *L. prostratum* resemble this species more, except for the connate styles.

Ancash: Ocros, 2,800 meters, *Weberbauer 5812* (type, forma). Chile.

Linum parvum Johnst. Contr. Gray Herb. 85: 172. 1929.

Erect herbaceous annual (or apparently sometimes enduring), 4–9 cm. high, the solitary minutely stipitate glandular stem laxly and sparsely cymose-branched above; leaves few, oblanceolate or linear, 5–10 mm. long, 1.5–2 mm. wide, costate but enervate, entire, acute, sparsely glandular and with 2 brown globose glands at the attenuate base; flowers solitary and apical or in unilateral cymes or these dichotomous, 3–6-flowered; pedicels 0.3–0.9 mm. long; sepals 3- or rarely 5-nerved, broadly lanceolate, entire, 3 (–5) mm. long, herbaceous and recurved at tip, sparsely pubescent within; petals yellow, 4.5–5 mm. long, 1.5 mm. wide, oblong-lanceolate, rounded or emarginate; stamens to 0.5 mm. long-connate, scarcely longer than the styles, these 2.5 mm. long, more or less connate below the middle, the stigmas capitate; capsule globose, 3–3.5 mm. broad, minutely stipitate glandular, bay-colored above the middle.—Relationship uncertain but no other western South American annual species has the abundant stipitate glands that, minute, are conspicuous on this annual of the loma formation (Johnston). Glands extremely minute, obscure in Stafford specimen, which, moreover, is surely more enduring than annual.

Arequipa: Local, sandy places, lower edge of fertile belt in hills of Mollendo, (*Johnston 3549*, type); also, the yellow flowers red-striate, *Stafford 823*.

Linum prostratum Lam. Encycl. 3: 525. 1791; 488. *L. polygaloides* Planch. Lond. Journ. Bot. 7: 487. 1848, ex char.

Glabrous perennial, the much divided caudex with many slender prostrate-ascending stems 7–30 cm. high, woody below, striate, often rubescent, the leafy (in age woody and leafless below) flowering ones dichotomously branched toward the tips; leaves oblong-lanceolate, acutish, somewhat or little attenuate at base, 10–15 mm. long, (2) 3–5 mm. wide, often soft-membranous, pale green, lower subopposite, the upper alternate, gradually reduced; basal glands inconspicuous or obsolete or sometimes solitary or binate and better developed; flowers typically opposite reduced leaves on short branchlets, subsessile or apparently, sometimes well-pedicelled; fruiting pedicels 2–4 mm. long, perhaps rarely longer; styles shortly connate below; sepals obviously unequal, or subequal, acute, or

abruptly acuminate, rigid, entire, obscurely nerved except midnerve at base, subglandular-fimbriate, the longer exceeding the depressed ovoid brownish capsule.—Except for sepals this after Planchon in part to include his species, his type in herb. Hook. & Lindley not seen. The Arequipa material is shrubby with longer pedicels. F.M. Neg. 18103.

Lima: In dry hills near Chancay, *Dombey;* also *Ruiz & Pavón,* type. Purruchucha, *Cuming 586* (det. Planchon, *L. polygaloides*).—Cajamarca: Near Celendín, 2,900 meters, petals vivid yellow, *Woytkowski 15?*—Junín: Cerro de Pasco, (*Mathews 615,* type, *L. polygaloides*).—Huancavelica: Near Pampas, gravelly hills, 3,200 meters, flowers yellow, *Stork & Horton 10249.* Prostrate in clay, flowers yellow, brown above, near Córdova, *Metcalf 30254.*—Cuzco: Huancaro, *Vargas 3162.*—Ayacucho: Toward Lucamas, 3,200 meters, *Metcalf 30321.*—Arequipa: Without data, *Isern 2503.* Mount Chiwata, shrub 0.5 meter high, *Eyerdam & Beetle 22128.* Near Mejía, (*Guenther & Buchtien 188; 188a*). Pasco, (*Guenther & Buchtien 188b*).

Linum selaginoides Lam. Encycl. 3: 525. 1791; 178.

Glabrous, the many stems more or less woody and leafless toward the base, where simple or often branched, ascending, densely leafy toward the usually corymbose tip, commonly 1–2 dm. long or longer; leaves alternate, imbricately crowded, subulate, mucronate-filiferous; flowers subsessile, solitary or few, terminal; petals whitish-pink, clawed; capsule obovoid-globose, obtuse or depressed, completely 10-celled.—The var. *chilensis* Planch., l.c. 179, has a much divided subterranean caudex, larger globose capsules.—Winkler, Pflanzenfam. ed. 2. 19b, includes Peru in the species' range without, however, data, and I rather doubt its occurrence, but a Lechler specimen cited in Mart. Fl. Bras. 12, pt. 2: 470 might be from Puno. F.M. Neg. 35184.

Peru: Fide Winkler. Chile; Uruguay; Brazil.

Linum usitatissimum L. Sp. Pl. 277. 1753; 165.

Typically annual, the tall stem simple at least at base, often several dm. high, the sessile linear or linear-lanceolate acute 3-nerved leaves 1–3 cm. long; pedicels finally 2 cm. long or longer; sepals acuminate, the elliptic outer 7–9 mm. long in fruit, the smaller inner more ovate, all 3-nerved at base; petals somewhat crenate; styles nearly or quite distinct; capsules barely longer than calyx,

the septa or partial septa glabrous; seeds to about 4 mm. long.—It is interesting that the widely cultivated flax varies in duration, size of seeds, and otherwise. One of the most ancient of intentionally grown plants, the generic name itself derived from one of great antiquity.

Puno: Near Puno, 3,830 meters, rarely, as here, in cultivation, *Soukup 87*. Origin probably oriental; cultivated in all temperate regions. "Lino."

Linum Weberbaueri Krause, Bot. Jahrb. 40: 277. 1908.

Suffrutescent, glabrous, erect, to 4 dm. high with many subvirgate stems and branches sparsely leafy especially below, where more or less ligneous, herbaceous above, scarcely 1 mm. thick and 8–10 lineately striate; leaves alternate or the lower binate, approximate and subopposite, tardily deciduous, linear-lanceolate, acuminate, narrowed to base, this with a pair of brownish-purple subglobose glands, 1-nerved, the intermediate 6–8 mm. long, 1–1.5 mm. wide, mostly little longer than the internodes; flowers solitary at branchlet tips on pedicels 6–12 mm. long; sepals 3-nerved, the midnerve prominent, ovate, acuminate, entire, biglandular at base, 2–2.3 mm. long, hardly 1.5 mm. wide; petals broadly obovate to rhomboid, obtuse or lightly emarginate, somewhat clawed, 6–7 mm. long, the upper third to 4.5 mm. wide, yellow; staminodia inconspicuous; staminal tube 0.8 mm. long, with 1 acute linear tooth between the filaments, these little dilated below, 4.5 mm. long, the ovate-oblong little emarginate anthers 1 mm. long; styles erect, 3.5–4 mm. long, one-quarter connate, stigma capitellate; ovary ovoid, the capsule little longer than calyx, about 3 mm. across, the strongly compressed brown seeds about 1.2 mm. long, 0.6 mm. wide.—After Krause. Allied by the author to *L. ramosissimum* Gay, Fl. Chile 1: 463. 1845, of northern Chile from which it differs (he thought) in habit, long pedicels, mostly alternate leaves, more prominent glands; but these are variable characters. Also, Reiche regarded the Gay plant as only a variety of *L. Chamissonis;* cf. *L. andicolum, L. prostratum.* All the Peruvian material of *Linum* has similar sepals, outer essentially 1-calloused, nerved at base, inner faintly to obviously fimbriate. Also to be considered here are the Ecuadorean *L. filiforme* Urban, Linnaea 41: 643. 1877 and *L. oligophyllum* Willd. ex. Schult. Syst. 6: 758. 1820, "calyx ovate, acuminate, stems branched, striate, scabrous, leaves linear, acute, squamiform, flowers solitary," origin unknown. Whether or not this is *L. Weberbaueri* it seems sensible to drop the name as essentially

a nomen nudum and a source of confusion in view of the well-described plants. F.M. Neg. 18015.

Junín: In mountains near Palca, 2,500 meters, *Weberbauer 1785*, type; 248.—Huancayo: Near Huancayo, 3,317 meters, *Soukup 2946*.—Lima: Below Surco, 2,000 meters, *Weberbauer 3215* (det. *L. oligophyllum*, herb. Dahlem).—Ayacucho: About 3,000 meters, *Weberbauer 5523* (det. Dahlem).—Libertad: Cachicadán, *Stork & Horton 9954* (det. *L. Macraei*, Standley). Near Angasmarca, *West 8169* (det. Johnston, *L. oligophyllum*).

2. HEBEPETALUM Benth.

Glabrous trees, with alternate coriaceous entire or lightly undulate-crenate leaves and small very caducous broadly triangular stipules. Flowers small, orange-yellow (or white?) in panicled cymules, terminal or in the upper axils. Sepals and petals 5, the former very unequal, the latter villous within and with a tiny lamella or appendage above the claw. Stamens 10, connate at base and coalescent with more or less developed glands. Ovary 3–5-celled, 1–2 ovules in each cell; styles 5, connate below or perhaps also free. Drupes ovoid or globose.—Apparently there is no fundamental difference between this South American tree and species of *Hugonia* L. from Africa and Malay except that they have larger flowers, a comparative situation that recalls certain genera in the Ericaceae. It seems open to doubt that the petal appendages, alike for both *Hugonia* and *Hebepetalum*, developed independently; probably only one genus is concerned.

Hebepetalum humiriifolium (Planch.) Benth. in Benth. & Hook. f. Gen. Pl. 1: 242. 1862. *Roucheria humiriifolia* Planch. in Hook. Lond. Journ. Bot. 6: 143. 1847.

Branches terete, leafless below; petioles 2–5 cm. long, margined, canaliculate above, reddish resiniferous at base; leaves few, spreading, oblong, obtuse or shortly acuminate, obtusely serrate, 8–13 cm. long, 3.5–5 cm. wide, chartaceous, lustrous, the midnerve impressed above, acute beneath, the lateral nerves slender, spreading, nearly straight, the fine veins parallel-striatulate; panicles terminal, shorter than the leaves, with 4 or 5 angulate-compressed branches scarcely 5 cm. long; pedicels nodiform; calyx cupulate, 2 mm. high, pellucid-punctate; fruits tipped with the 5 styles, blue-black.—Flowers orange, tree 8–22 meters (Klug).

Loreto: Florída, *Klug 2339* (det. Sandwith). Mishuyacu, *Klug 683*. To the Guianas.

3. ROUCHERIA Planch.

Similar to *Hebepetalum* but petals not clawed, stamens 10–15, the high tube apparently lacking glands without, and the styles 3 with stigmas much broader. Ovary 3-celled but 2 cells often collapsed. Fruit incompletely known.—Named for the romantic French poet Roucher, politically unfortunate.

Roucheria calophylla Planch. in Hook. Lond. Journ. Bot. 6: 142. 1847.

Branches terete; petioles 6 mm. long, leaves attenuate to base, 5–7.5 cm. wide, 2.5–3 dm. long, paler beneath, rigid-chartaceous, nerves prominent both sides, under lens obsoletely serrulate; bracts and calyces minutely pubescent; flowers in fascicles of 7 or 8, the narrow petals fugacious; drupe ovoid.

Peru: (Probably). Brazil; Guiana.

4. SACOGLOTTIS Mart.

Rather similar to *Houmiria* but stamens 10 or 20, sometimes connate only at base, often with setiform staminodia, the 5 longer sometimes apically 3-dentate and 3-antheriferous. Anthers 2–4-celled. Intrastaminal disk dentate, parted or squamate. Ovary 5-celled, the 1-ovuled cells episepalous. Flowers sometimes yellow.—For a key to the Amazonian species of Brazil see Ducke, Archiv. Inst. Biol. Veg. Rio Jan. 4: 28–29. 1938.

The large fruits of *S. amazonica* Mart. (and probably other species) are common drift fruits according to R. O. Williams, Fl. Trinidad & Tobago 1: 151. 1929.

Sacoglottis Uchi Huber, Bol. Mus. Paraense 2: 489. 1898.

A large tree, glabrous except the inflorescence, the branchlets slender; leaves distichous, oblong-lanceolate, more or less acuminate each end, mostly 9–17 cm. long, dentate or crenate-serrate (early marginally glandular); peduncles glabrous or nearly, the more or less regular cyme trichotomous or dichotomous in the leaf-axils of the new branches or in the newer leaves of the past year's branches, all together forming veritable bouquets of many small yellowish-green flowers mostly in 3's, the branchlets hirsutulous; sepals in-

distinctly imbricate, rounded; petals oblong or nearly, pubescent both sides; stamens all fertile, the larger 4, the 2 smaller with globose-elliptic anthers, filaments papillose, variable as the long-extended connectives in shape, sometimes irregular or partly serrate; disk composed of 10 flat free ovate-lanceolate scales half enclosing the ovary; style as long, stigma 5-lobed; drupe greenish, 7 cm. long, oblong-ellipsoid.—Illustrated, Huber, opposite page 490 (flowers). Perhaps most likely to occur within Peru as, fide Ducke, widely distributed from Pará to the Purus and Solimoes. Said to attain 30 meters. Cultivated in Amazonian area for the fruits. Also expected to occur within Peru is *S. reticulata* Ducke, Archiv. Inst. Biol. Veg. Rio Jan. 1: 206. 1935, with 20 fertile stamens, the 5 larger trifid with 3 anthers.

Peru: (Probably). Amazonian Brazil.

5. **HOUMIRIA** Aublet

Somewhat balsamiferous trees or tall shrubs with entire or crenate leaves that are also glandular-punctate on the margins, and white or greenish flowers that usually are in axillary or lateral cymes. Sepals nearly free. Petals 5, narrow. Stamens 12–20, more or less connate, the free part of filaments densely papillose or warty; anther cells bearded. Interstaminal disk composed of 20 more or less united scales. Ovary 5 (4)-celled, the 2-ovuled cells epipetalous; stigma 5-parted.—Caribbean name Touri, also Houmiri (Aublet); the author wrote *Houmiri* which Jussieu, Gen. Pl. 435. 1789 latinized to *Houmiria;* others, but later, have made other suggestions (St. Hilaire, *Humiria;* Richard, *Humirium*, etc.).

Leaves usually subsessile, eglandular above at base.

Leaves not auricled ..... *H. floribunda.*

Leaves auriculately produced at base ..... *H. balsamifera.*

Leaves petioled, 6–8 glandular above at base ..... *H. crassifolia.*

Houmiria balsamifera Aublet, Pl. Guian. 1: 564. *pl. 225.* 1775.

Large tree (or shrub) with distichous oblong-lanceolate leaves that bear a row of approximate glands at the margin beneath between the obsolete crenulations; branchlets acutely wing-angled by the decurrent petioles, these 1–2 mm. long, and grooved by the base of the leaves, this produced a little auriculately and thus rounded-amplexicaul, the blade 3–4 cm. wide, (6) 9–11 cm. long, eglandular

above; peduncles little branched, the 30–50-flowered dense cymes 2.5–5 cm. long; pedicels articulate, 1–3 mm. long; calyx glabrous, 0.5–0.8 mm. long, lobes suborbicular, scarcely 1 mm. wide, the inner much smaller, obscurely or not imbricate; petals free, 4.5 mm. long, narrowed to base, glabrous or sparsely puberulent; filaments connate below, densely scabrous-papillate, the globose anther cells with a few long straggly trichomes, the ligulate connective much extended above; ovary apically barbate about or at base of the angled style.—To 20 meters high or taller, the crown much branched. Illustrated, Mart. Fl. Bras. 12, pt. 2: *pl. 92* (flower and leaf).

Loreto: Balsapuerto, shrub in dense woods, *Killip & Smith 28681*. To the Guianas.

Houmiria crassifolia Mart. Nov. Gen. & Sp. 2: 143. *pl. 198*. 1826.

Leaves alternate, with petioles 2–2.5 cm. long and broadly wing-appendaged; peduncles trichotomous, the branches bifurcate; calyx lobes much imbricate; filaments densely tuberculate.—Type locality, Serra de Arara Coara, Río Japura, is near the Peru frontier (Amshoff).

Peru: (Undoubtedly). Brazil; British Guiana.

Houmiria floribunda Mart. Nov. Gen. & Sp. 2: 145. *pl. 199*. 1826.

Shrub or tree with fragrant balsamiferous bark; petioles alternate, obsolete or rarely to 2 cm. long; leaves eglandular above at base but more or less closely so beneath in the entire or repand-crenulate margin, sometimes also puberulent, chartaceous, lustrous above, finely veined both sides, variable in form but usually about elliptic, the larger 2–6 cm. wide, 2.5–10 cm. or even 15 cm. long, shortly and obtusely (or acutely) acuminate to emarginate; peduncles lateral, alternately forked, wing-angled, the inflorescence 2–8 (14) cm. long; pedicels 1–5 mm. long; calyx glabrous or pubescent, 0.7–1.5 mm. long, the lobes more or less imbricate, ciliolate; petals 4.5–6 mm. long, white or greenish; filaments connate to middle, densely papillose-scabrous; globular anther cells with liguliform extended keeled connective; ovary apically barbate about the filiform obscurely angled style; drupe narrowly to broadly ellipsoid or obovoid, 8–14 mm. long, glabrous, the flesh thin, seeds 2–4.—There are several named varieties of doubtful merit. Tree 18 meters high, flowers white (Williams); pale yellow (Weberbauer); orange (Klug). Common throughout the hyléa (Ducke). Illustrated, Mart. Fl. Bras. 12, pt. 2: *pl. 92* (fruit).

San Martín: Campana near Tarapoto, *Spruce 4335; Raimondi.* Moyobamba, *Weberbauer 4478.* Zepelacio, *Klug 3706* (det. Standley).—Loreto: Mishuyacu near Iquitos, *Klug 1315; 685* (det. Moldenke). Balsapuerto, *Klug 2846* (det. Standley). Yeveros, *Raimondi.* Brazil. "Umiry." "apacha-rama."

6. VANTANEA Aublet

Trees, often tall, or shrubs, with entire leaves and white or red flowers. Sepals more or less connate and often with a dorsal gland; stamens many, basally connate, the inner sometimes staminodal, the anther cells 4. Intrastaminal disk fleshy, subentire or irregularly dentate. Ovary 4–6-celled the 2-ovuled cells episepalous. Stigma obsoletely 4–6-lobed. Drupes smooth, rugulose or rarely tuberculate.—Ducke, Archiv. Inst. Biol. Veg. 4: 31. 1938, has given a key to the Amazonian species of Brazil.

Vantanea cupularis Huber, Bol. Mus. Goeldi 6: 83. 1910. *Licania celativenia* Standley, Field Mus. Bot. 17: 254. 1937, fide Ducke.

Branchlets slender, gray-barked, few leaves toward the tips; petioles 1–2 cm. long, grooved above; leaves distichous, glabrous, elliptic, acute at base, shortly and obtusely complicate-rostrate, 6–10 cm. long, 3–5 cm. wide, subcoriaceous, lustrous and prominently nerved and veined both sides, the reticulation lax; inflorescence terminal or in the upper axils, 2–3 puberulent commonly 4-dichotomous cymes 5 cm. long and broad, peduncles 2–2.5 mm. long, bracts and bractlets early deciduous, pedicels to 2 mm. long; buds 6–7 mm. long, the calyx 1 mm. long, broadly cupulate, subglabrous, margin scarcely undulate; petals whitish, linear, 8 mm. long, 2 mm. wide, obtuse or acutish or cucullate, ashy hirtellous without, soon deciduous; stamens about 80, the longer little shorter than petals, anther connective acute, elongate; disk denticulate, tomentose as shorter ovary.—Probably in Peru as Ducke records it as nearly throughout the Amazon in non-flooded forests, Pará to Rio Solimoes, a tree 6–30 meters tall or taller. *V. tuberculata* Ducke, l.c. 31, from the upper Amazon, has a tubercled fruit. Standley's plant, ex char., differs in stout brown-barked branchlets, rigid-coriaceous obovate-oblong leaves 6–11.5 cm. by 3.5–6 cm., broadly rounded at tip and lightly emarginate, nerves manifest but not elevated, the veins obsolete both sides, fruiting inflorescence sparsely pilose, fruits sessile, the immature 2 cm. long, subglobose, densely puberulent-

tomentose and sparsely hirsute, or 3 cm. long, oblong-ovoid, acute; and if it belongs here the description of *V. cupularis* must be changed to include the above data.

Peru: (Probably, as noted). Brazil.

Vantanea peruviana Macbr. Candollea 5: 371. 1934.

Glabrous except the inflorescence; branches densely branched, the stout branchlets more or less tuberculate; petioles 2.5 mm. long; leaves broadly elliptic or elliptic-obovate, shortly cuneate at base, rounded-retuse at apex, to 8 cm. long, 4.5 cm. wide or mostly about 5 cm. long, 3.5 cm. wide, rigid-coriaceous, lustrous above, opaque beneath, the nerves scarcely obvious; inflorescence 3 cm. long, 5 cm. broad; branchlets and very short pedicels angled, sparsely and minutely puberulent or glabrate; calyx shortly 5-lobed, the lobes eciliate; buds nearly linear, 10 mm. long; staminodia none(?).—Incompletely described but thought to be nearest *V. minor* Benth. of British Guiana, the flowers notably shorter, the calyx glabrous. A tree about 12 meters high.

Loreto: Mishuyacu, near Iquitos, *Klug 1130*, type.

ERYTHROXYLACEAE [HBK.] Lindl.

Reference: O. E. Schulz, Pflanzenreich IV. 134. 1907.

Glabrous shrubs or trees with entire usually alternate leaves, a single often conspicuous interpetiolar persistent or caducous stipule (rarely, not in Peru, stipules binate), and small flowers ordinarily a number or many borne in the axils of leaves or branchlets. Pedicels more or less enlarged apically, 5-angled, with 2, exceptionally 4, basal bracts. Flowers actinomorphic, 5-merous, almost always hermaphrodite. Calyx persisting, sometimes divided to base, the division somewhat imbricate. Petals 5, free, usually with a scale or appendage within at base. Stamens 5, biseriate, the filiform filaments more or less connate; anthers cordate, 2-celled, longitudinally dehiscent. Pistils 3, free or partially connate, usually only 1 cell of the ovary fertile, the pendulous ovules 1 or 2. Fruit drupaceous, the seed with or without albumen.

1. ERYTHROXYLUM P. Brown

Essentially the only genus—the other African with a single species—and thus character of the family. Branchlets somewhat compressed. Petals oblong or nearly, often obtusish, obviously un-

guiculate. Filaments urceolately connate. Ovary often truncate. Drupe at maturity red.—The name, being composed of the Greek words meaning "red" and "wood," has been written *"Erythroxylon."*

Some species, as *E. Coca*, are of great economic and social significance, as the leaves contain the important alkaloid cocaine. The use of the leaves in Peru was described by Monardes, a physician of Seville, in 1580, but botanical specimens were first brought to Europe by the French botanist Joseph de Jussieu, who, on the expedition of Condamine, observed its daily use by many of the inhabitants of the Andes. Schulz gives a partial bibliography; the early account of J. H. Uanul, 1794, in Lima, became a classic in the literature on coca.

The following descriptions are essentially or mostly after Schulz and the key is only suggestive; there may be too many species names—or too few—for some collections determined by the late monographer, or at least with his assistance, agree poorly with characters; after nearly fifty years' accumulation of materials since Schulz's revision it is not surprising that a new study is in order.

The publication of *E. Coca* var. *Spruceana* Burck, Teysmannia 1: 455. *pl. 2.* 1890, based on a cultivated shrub supposed to have originated in Peru, has not been seen; its origin apparently was an error, for a cited synonym is *E. truxillense* Rusby, Amer. Drug. Circ. & Chem. Gaz. 44: 220. 1900 and 45: 49. 1901.

The term "leaves bilineate" in the key refers to lines apparently in the leaf-nervation that parallel the midnerve; they are constant enough in some species to furnish a convenient key character (as by Schulz himself, l.c. 70 and 71) but that they are discernible is not of taxonomic significance; cf. Schulz, l.c. 4, who quotes Nevinny, the first to show that the lines are merely marks or pleats which result from the manner in which the young leaves are developed.

Stipules obviously striate.

Calyx lobes somewhat imbricate especially in bud, in anthesis this mostly apparent by a pleat in the tube.

Petals longer than the calyx lobes; flowers often many (20–40). *E. floribundum.*

Petals and calyx subequal or the latter longer; flowers usually fewer.

Calyx lobes lanceolate, to 6 mm. long; stipules 2.5–5 cm. long; leaves long-cuneate obovate, to 4 dm. long or longer. *E. macrocnemium.*

Calyx lobes ovate, shorter; stipules shorter; leaves smaller, mostly more abruptly and shortly narrowed to base.

Calyx lobes rather acuminate; leaves often a dm. and a half long or longer, nervation rather prominent. *E. macrophyllum.*

Calyx lobes acute; leaves mostly shorter, rather obscurely reticulate..... *E. lucidum.*

Calyx lobes distinct.

Leaves more or less acuminate or acute.

Stipules marginally fimbriate and the setae fimbriate-ciliate. *E. fimbriatum.*

Stipules and setae not at all or obscurely fimbriate.

Staminal tube half as long as calyx; petioles slender, 6–10 mm. long..... *E. amplum.*

Staminal tube little if at all shorter than calyx; petioles 3–6 mm. long, usually stout.

Stipules conspicuously long and long-bisetose. *E. comosum.*

Stipules shortly trisetulose.

Pedicels 1–3 (5) mm. long; leaves often large, shortly to very shortly acuminate, mostly elliptic-obovate. *E. amazonicum.*

Pedicels mostly 4–8 mm. long; leaves mostly long-acuminate, about 1 dm. long. *E. acuminatum, E. paraense.*

Leaves rounded and often minutely retuse at tip.

Leaves broadly elliptic, 3–5 cm. wide..... *E. Raimondii.*

Leaves more or less oblanceolate, 2–3 (4) cm. wide. *E. deciduum.*

Stipules smooth, estriate unless faintly in *E. Ulei.*

Leaves rounded at tip but often acutish or (and) mucronate, mostly 3–6 cm. long.

Leaves rarely 18 mm. wide..... *E. Tessmannii.*

Leaves, at least mostly, 2–5 cm. wide.

Stipules faintly striate..... *E. Ulei.*

Stipules not at all striate, smooth.

Leaves obscurely if at all mucronate, not bilineate. *E. hondense.*

Leaves mucronate, often bilineate..... *E. Coca.*

Leaves more or less acuminate, sometimes shortly and obtusely, mostly 7–10 cm. long or longer.

Leaves obtusely acuminate, chartaceous to coriaceous.

Stipules faintly striate; leaves usually less than 7 cm. long. *E. Ulei.*

Stipules not at all striate.

Leaves elineate, usually long-acuminate. *E. luculentum, E. Mamacoca.*

Leaves bilineate, coriaceous, very shortly acuminate. *E. Shatona.*

Leaves acutely acuminate, obviously membranous. *E. gracilipes.*

Erythroxylum acuminatum R. & P. Fl. Peruv. 4. *pl. 399.* 1802; 45. *E. patens* Ruiz, ex O. E. Schulz, Pflanzenreich IV. 134: 45. 1907.

Becoming a tree 6 meters high, the slender branches gray, opaque, little verruculose, the erect-spreading branchlets subangled, 1.5 mm. thick; stipules subpersisting, 3 mm. long or on innovations to 9, between leaves to 11 mm. long, striate, broadly lanceolate, long, 3-setulose at the obtusish apex; petioles 3.5–4 mm. long; leaves obovate or broadly elliptic, acutish at base, obtusely short-acuminate, 7–12 cm. long, 3–6 cm. wide, papyraceous, gray-green above, paler or subrusty and opaque beneath, the midnerve there very obtuse, the subhorizontal laterals elevated, these sulcately impressed above; flowers 4–12; pedicels 4–8 mm. long; bracts ovate, acute, 1 mm. long; calyx lobes lanceolate, obtusish, 1.5–2 mm. long; petals 3–3.5 mm. long, one third clawed, the ligule one-third as long as blade; lateral auricles three times longer than posterior; stamen cup shorter than calyx the ovary and cup subequal the latter 10-crenate, the stamens 4.5 mm. long, the styles 2 mm. long or in long-styled flowers 4.5 mm., the stamens 1.5 and 2.5 mm.; drupes about 12 mm. long, 4.5 mm. across, oblong-ovate, acutish, subtrigonous (after icones).—The species having been illustrated with details it is to be accepted, following precedent, in this and other works. The flowers are said to be very fragrant. Suggests *E. paraense* but perhaps differs in more persisting, rather long-setose stipules, proportionately broader, slightly thinner leaves, longer pedicels. However, I have not been able to see the monographer's character of "more persisting stipules" and it is possible that the type sheets ought to be interpreted more

liberally, which would perhaps permit the inclusion of at least the Peruvian material of *E. paraense.*

Huánuco: Puente of Pillao, Ruiz & Pavón in 1788, type; also at Chachahuasi. Ecuador.

Erythroxylum amazonicum Peyr. in Mart. Fl. Bras. 12, pt. 1: 167. 1878; 34.

Much like *E. paraense;* branchlets said to be more strongly compressed, 1.5–2.5 mm. wide; stipules caducous, obtusish, very shortly 3-setulose, 6–15 mm. long; petioles 3.5–5 mm. long; leaves somewhat obovate, cuneate-narrowed to the acutish base, 6–13 cm. long, 3–6 cm. wide, coriaceous, not diaphanous, the lateral nerves both sides but especially beneath little prominent; flowers 3–9, the pedicels 1–5 mm. long, stout, enlarged toward apex; calyx nearly one-half divided, the lobes 1–1.2 mm. long; petals 3–4 mm. long; staminal tube about as long as calyx; mature drupes 12–16 mm. long.—As remarked by the monographer both these species comparable to *E. citrifolium* St. Hil., 36, widely distributed from Mexico to the Guianas and southern Brazil; it seems possible that a single variable species is concerned and in this case the name of St. Hilaire has precedence, or perhaps even *E. acuminatum* R. & P. However, according to Schulz *E. amazonicum* is distinct from both *E. paraense* and *E. citrifolium* by its coriaceous not pellucid leaves, pedicels strongly enlarged at apex, cup and calyx subequal, drupes large, while *E. citrifolium* is said to differ from *E. paraense* in less obtuse stipules, leaves long acuminate, lateral nerves manifest beneath, all dubious distinctions, it seems to me. Cf. also *E. amplum* and *E. acuminatum.* F.M. Neg. 19451.

Loreto: Mishuyacu near Iquitos, *Klug 82; 549; 610; 1144; Williams 3759.*—Río Acre: tree 25 meters high, Río Macauhán, *Krukoff 5526; 5748* (so distributed). Brazil to Trinidad.

Erythroxylum amplum Benth. in Hook. Lond. Journ. Bot. 2: 372. 1843; 34.

Much like *E. floribundum,* fide Schulz, but the shorter triangular calyx teeth 1.5 mm. long and not at all imbricate; petioles 6–10 mm. long; leaves 13–24 cm. long or longer, 4–8.5 cm. wide or wider; flowers 12–30, the petals 4–4.5 mm. long, scarcely more than one-third clawed, the coarsely denticulate lateral auricles twice as long as the posterior; brachystylous flowers with obovate truncate ovary, the style 1.2 mm. long, the dolichostylous with episepalous stamens 2.2 mm. long.—Apparently a shrub or small tree. Notwithstanding

his comparison Schulz placed this with the segregates of *E. citrifolium*, which is noted here under *E. amazonicum* and to which species I have referred with some reluctance the specimens I determined at Dahlem, with the friendly help of Schulz, as *"E. amplum"*; but the petioles of that as to type are longer and, especially, the staminal cup is only about half as long as the calyx; it is possible of course that these characters are not significant. F.M. Neg. 12606.

Peru: (Perhaps). Brazil; British Guiana.

Erythroxylum Coca Lam. Encycl. 2: 393. 1788; 83.

A smooth densely leafy shrub ordinarily between 1 and 2 meters high, the reddish-brown bark closely verruculose, the many suberect branchlets compressed, about 1.5 mm. thick; stipules persisting, 3–3.5 mm. long, acutish and very shortly bisetulose, many at base of innovations and between the leaves; petioles 2.5 mm. long; leaves elliptic or somewhat obovate, acute at base, acutish or rarely rounded at tip but obviously mucronate, usually 4–7 (10) cm. long, 3 (2)–4 (4.5) cm. wide, the midnerve impressed above, obtusely prominent beneath, the approximate slender lateral nerves equally conspicuous both sides and reticulate with the secondary, membranous and diaphanous with longitudinal lines more or less apparent, pale green and slightly lustrous above, glaucescent or slightly brownish and opaque beneath; flowers 6–12 (–20) in axils of leaves and branchlets, the pedicels 3.5–4 mm. long; calyx to three-fourths parted, the segments ovate, acute, 1 mm. long; petals 4.5 mm. long, broadly elliptic, shortly clawed, with ligule one-half its length; lateral auricles denticulate, the much shorter posterior minutely tridenticulate; staminal cup as long as or longer than calyx, 10-crenulate; stamens in short-styled flowers 4 mm. long, the styles only half as long, in long-styled flowers 2 and 3 mm. long, the styles 4 mm. long; drupe orange when ripe, 7–8 mm. long, 3.5–4 mm. thick, oblong-ovoid, acutish, trigonous, sulcate.—Illustrated, Schulz, 84; Bot. Mag. *pl. 7334*.

Commonly cultivated even in antiquity and either native or established in warm moist regions at middle elevations; the well known "coca" and the source of the drug cocaine; cf. Gosse in Mem. Cour. Acad. Roy. Sci. Belgique 12. 1861, a standard work. The active principle was isolated as cocaine in 1858 in Berlin by Niemann who was aided by the collections made by Spruce.

San Martín: Near Tarapoto, *Williams 5814*, et al.—Junín: Puerto Bermudez, *Killip & Smith*.—Huánuco: Chinchao, *Dombey*.

Pillao, *Ruiz & Pavón*. Río Chinchao, *4972*. Huánuco, *Haenke*.—Amazonas: Moyobamba, *Stuebel 65*.—Loreto: Yurimaguas, *Williams 4647*. Iquitos, *Klug 1117*, et al.—Ayacucho: Near Aina, in thickets, *Killip & Smith 22746*.—Cuzco: Cosñipata, *Weberbauer 6941a*. San Miguel, Urubamba Valley, *Cook & Gilbert 1127; 1089;* also at Santa Ana, *1574* and *Herrera 2638*.—Puno: San Govân, *Lechler 2220*. Without locality, *Jussieu*, type. Bolivia; Brazil. "Coca," "cuca-cuca," "el coq."

Erythroxylum comosum O. E. Schulz, Pflanzenreich IV. 134: 32. 1907.

Much branched shrub, the tips of the young branchlets comose because of the long (to 2 cm.) stipules that equal or exceed the new leaves; stipules linear-lanceolate, striate, the bifid apex terminating in setae 2–4 mm. long; petioles 2–2.5 mm. long; leaves ovate or elliptic, acute at base, shortly and nearly obtusely acuminate, mucronulate, about 3 cm. long, 13–16 mm. wide, the midnerve above evidently acute, prominent and subobtuse beneath, the lateral nerves slender and little conspicuous even below, coriaceous, subdiaphanous, lustrous especially above; flowers 3–5 in leaf-axils on pedicels 2–3 mm. long, the outer striate bractlet 5 mm. long, 1-setose; calyx three-fourths parted, the lanceolate free segments 1.5 mm. long; petals 3.5–4 mm. long, rounded at tip from claw one-half the length, the ligule as long; lateral auricles joined with inflexed lobe and half as long as posterior; in long-styled flowers stamen cup and ellipsoid ovary at least as long as calyx, 10-dentate, the stamens 1.5 and 2 mm. long; style 3 mm. long.—The similar *E. Kirkianum* O. E. Schulz, Repert. Sp. Nov. 30: 179. 1932, Amazonian, is a tree with narrowly obovate leaves 4.5–7 cm. long, 2–3 cm. wide or larger, pedicels 1–1.5 mm. long, staminal cup shorter than calyx. Illustrated, Schulz, 32.

Loreto: Cerro de Escaler, 1,200 meters, *Ule 6531*, type.

Erythroxylum deciduum St. Hil. Fl. Bras. 2: 95. 1829; 57.

Shrub or small tree, the grayish or reddish-brown bark of the branches densely verrucose with rather narrow white lenticels, the approximate suberect slightly compressed branchlets 2.5–3 mm. wide; stipules narrowly ovate, striate, minutely 3-setulose, 3–5 mm. long; petioles 2.5–3.5 mm. long; leaves somewhat oblanceolate, acutish at base, obtuse and often a little emarginate, reddish-mucronulate, mostly 6–11 cm. long, about 2–4 cm. wide, coriaceous

(Peru specimen submembranous), diaphanous, lustrous above, opaque beneath, the midnerve slender and impressed above at base, obtuse and very prominent beneath, the lateral nerves especially above obvious, the secondary conspicuously and densely reticulate both sides; pedicels few to many, 4–20 mm. long; calyx three-fourths parted, the semiovate acutish lobes about 1.5 mm. long, distinct; petals 4–5.5 mm. long, broadly oblong, the double partly 3-denticulate appendage barely one-third as long; staminal tube in brachystylous flowers shorter than calyx and ovary, the stamens 4–5 mm. long; drupes typically 10–13 mm. long, 4.5–5 mm. broad, subattenuate at base, very obtuse.—The Peruvian specimen, following Schulz key, apparently may be assigned readily to this variable species of southern Brazil and Argentina; the monographer gives several varieties accounting for variations in foliage, size of flowers and drupes. Illustrated, Mart. Abh. Math. Nat. Cl. Akad. Muench. 3, pt. 2: *pl. 10* (as *E. nitidum*). F.M. Neg. 35195.

Junín: Huacapistana, shrubby tree with white flowers, *Sandeman 4531*. Southern Brazil to Paraguay.

Erythroxylum fimbriatum Peyr. in Mart. Fl. Bras. 12, pt. 1: 162. 1878; 38.

Branches terete but with elevated acutely angled decurrent lines, the pale brown bark obscurely verruculose; branchlets compressed, erect-spreading, about 1.5 mm. thick; stipules persisting, little shorter than the stout petioles (2.5–4 mm. long), ovate, obtusish, decurrent, striate, terminated by 3 fimbriate setae, the outer 2 recurving and as long or longer than the body of the stipule, the middle about half as long; leaves elliptic or oblong-obovate, somewhat narrowed to the obtuse or acutish base, shortly and acutely acuminate, 6.5–12 cm. long, 2.5–4 cm. wide or wider, callose-punctate, membranous, very diaphanous, grayish green and lustrous above, brown and opaque beneath, the acute extremely slender midnerve sulcate at base above, the many lateral nerves there impressed, densely reticulate, nervose, with the secondary only beneath; flowers 3–6 in leaf and branchlet axils; fruiting pedicels 5 mm. long; bracts ovate, striate, long-setose; calyx segments not imbricate, about 1 mm. long; drupe apparently ovate, about 8 mm. long, 4 mm. thick.—Stipule illustrated, Schulz, 3. F.M. Neg. 19459.

Río Acre: *Ule 9471* (det. Schulz). Amazonian Brazil.

Erythroxylum floribundum Mart. Beitr. Kenntn. Erythrox. 1840; Abh. Math. Nat. Cl. Akad. Muench. 3, pt. 2: 398. 1843; 25.

Becoming a stout densely branched shrub or small tree, the terete branches to 5 mm. thick, the erect-spreading compact branchlets 2 mm. thick; stipules finally deciduous, 9–15 mm. long, lanceolate, acutish, 3-setulose, closely striate; petioles stout, 5–9 mm. long; leaves oblong-elliptic, acute or rounded at base, more or less acuminate but not mucronate, 10–20 cm. long or longer, about 4–8 cm. wide, coriaceous but not rigid, subpellucid, gray-green and lustrous above, glaucous-reddish and dull beneath, the midnerve above acutish and prominent at tip, very obtuse and red-violet at base beneath, where the lateral nerves are prominent and with secondary reticulate; flowers 15–40 on pedicels 2–7 mm. long; outer bract 3 mm. long, ovate, acuminate, striate; calyx divided nearly to base, the segments especially in bud imbricate, 2–3 mm. long, broadly ovate, acuminate; petals oblong, broadly clawed, 3.5–4 mm. long, the ligule half as long; lateral auricles nearly 3 times longer than posterior, these joined by an inflexed lobule; short-styled flowers with stamen cup half as long as calyx, 10-crenulate, stamens 3 mm. long; style 1.5 mm. long; long-styled, the stamens unequal, the styles 3 mm. long; drupe (fide Moore) 7 mm. long.—F.M. Neg. 19461.

Peru: (Probably). Brazil; Colombia.

Erythroxylum gracilipes Peyr. in Mart. Fl. Bras. 12, pt. 1: 159. 1878; 82.

Gray older branches densely verruculose; branchlets erect-spreading, compressed, 2 mm. broad; stipules persisting, ovate, obtuse, not setulose, 1–2 mm. long, only 1 or 2 at branchlet base and between leaves and these very remote; petioles 5–8 mm. long; leaves oblong-elliptic, acutish at base, acute or shortly acuminate and mucronulate, 11.5–18.5 cm. long, between 4 and 6.5 cm. wide, diaphanous and more or less membranous, pale green and somewhat lustrous above, rather glaucescent and dull beneath, longitudinal lines obviously areolate, midnerve rounded and prominent at base beneath as the lateral nerves, the secondary rather prominent both sides, closely reticulate-nervose; flowers 12–16 in axils, pedicels 5–10 mm. long, very slender; bract ovate, acute, 1.5 mm. long; calyx nearly three-fourths parted, the acuminate semiovate segments 1.2 mm. long; lateral auricles denticulate; short-styled flowers with stamen-cup about as long as calyx, 10-crenate, stamens 3 mm. long, style 1 mm. long; drupe ovate, acute, 7 mm. long.—The var. *exareolatum* Schulz, confused with *E. Mamacoca*, has petioles 4 mm. long, leaves 10–14 cm. long, 4–4.5 cm. wide, pale green beneath, without lines and not areo-

late, the pedicels only 1 mm. long (perhaps a species?). Three to ten meter tree, flowers white or yellow, fruit edible (Klug). F.M. Neg. 12621.

Loreto: Near Iquitos, *Klug 1440*. Amazonian Brazil; Colombia. "Sacha mangua."

Erythroxylum hondense HBK. Nov. Gen. & Sp. 5: 176. 1822; 95.

Shrub or tree to 6 meters high with grayish white verruculose slender branches, the subhorizontal compressed branchlets about 1 mm. thick; petioles 1.5–3 mm. long, little longer than the stipules, these triangular, not nerved, the obtuse tips 3-setulose, dense at base of innovations; leaves elliptic or obovate, acutish at base, rounded or somewhat emarginate at apex, 3–11 cm. long, about 2–5 cm. wide, membranous, pale green and scarcely lustrous above, dull and glaucescent or reddish beneath, the midnerve there very prominent, the lateral nerves so above, the reticulate venation not conspicuous; flowers 1–3 in axils of branchlets; pedicels 1.5–6 mm. long, the ovate acute bracts about 1 mm. long; petals 3–4.5 mm. long, about one-third clawed, the ligule to one-half the length of the blade; lateral auricles three times longer than posterior; stamen-cup in short-styled flowers equal to calyx, 10-crenulate, stamens 3.5–4 mm. long, style 1.5 mm. long, stigma scarcely broader; in long-styled flowers stamens 1–1.4 and 1.5–2 mm. long, style 2.5–3 mm. long; drupes ovate, 8 mm. long, not sulcate.—In the long-styled flowers the styles are sometimes long-connate as in the case of species grouped by the monographer in a separate section designated *Microphyllum*. Leaves in type elineate, obovate-elliptic, rounded-retuse and obsoletely mucronulate, 24–30 mm. long, 14–17 mm. wide; I have not seen recently the Poeppig specimen nor the type and the species to me is obscure. F.M. Negs. 12622; 35194.

Huánuco: On Cerro de San Cristobal, (*Poeppig 1336*). To Colombia. "Mama-coca."

Erythroxylum lucidum HBK. Nov. Gen. & Sp. 5: 179. 1822; 24.

Shrub or small tree sometimes 6 meters high, the erect trunk 5–7 cm. in diameter, the grayish-brown more or less verruculose branches 4.5 mm. thick, the erect-spreading somewhat compressed branchlets 2.5 mm. thick; stipules narrowly lanceolate, obtusish and shortly bisetulose, densely striate, 8–14 mm. long, finally

deciduous; petioles 5–8 mm. long; leaves oblong-elliptic or obovate, acute or subrotund at base, acute or shortly acuminate, 7–14 cm. long, 3–6.5 cm. wide, diaphanous, the older coriaceous, greenish-brown and rather lustrous above, dull, paler and somewhat brown or glaucous beneath, densely reticulate-venose, the midnerve little prominent above, the lateral nerves obscure both sides; flowers 7–11; bracts broadly lanceolate, acute, striate, 2.5–3.5 mm. long; calyx segments imbricate, broadly ovate, acute, 2.5–4.5 mm. long, the whitish petals 2.5–4.5 mm. long, the oblong blade about one-half clawed, the ligule half as long; lateral auricles twice as long as the posterior; short-styled flowers with stamen cup shorter than calyx, 10-denticulate, stamens 4–5 mm. long, style 1.5 mm. long, the depressed stigma a little broader; stamens of long-styled flowers 1.2 and 2.2 mm. long, styles 3.2 mm. long; drupes subglobose or ovate, 5–7.5 mm. long, 4 mm. thick.—Illustrated (flower), Schulz, 26. F.M. Neg. 12626.

San Martín: Tarapoto, *Ule 6389; Williams 5635; 5865; 6668.* Juanjuí, *Klug 3767* (det. Standley). San Roque, *Williams 7275.*—Loreto: Yurimaguas, *Williams 4685; 7827; 3796; Killip & Smith 27540.* Middle Marañón, *Tessmann 3799.* Bolivia to Mexico. "Murcu tarilla colorado," "urcu-ynguina" (Williams).

Erythroxylum luculentum Macbr. Candollea 5: 372. 1934.

Shrub, all parts lustrous, the long slender sparsely branched branches more or less conspicuously lenticellate; stipules persisting, not nerved, thick-carinate, 2.5 mm. long, apparently shortly setulose; petioles slender, 5–6 mm. long; leaves oblong-elliptic, mostly about 12 cm. long, 4 cm. wide, acute at base, obtusely acuminate, lustrous especially above and there olivaceous except for the yellowish midnerve and veins, yellowish green and paler beneath, laxly reticulate both sides, long lines not evident, chartaceous-membranous; pedicels 5 mm. long; drupes 10–12 mm. long, somewhat curved at tip.—Probably allied to *E. Ruizii* Peyr. of Ecuador, which however has dull leaves; its long and slender petioles possibly distinguish it from similar Peruvian species as *E. Mamacoca* but type without flowers and doubtless should not have been described.

Loreto: La Victoria, *Williams 2788*, type.

Erythroxylum macrocnemium Mart. Beitr. Kenntn. Erythrox. 1840; Abh. Math. Nat. Cl. Akad. Muench. 3, pt. 2: 402. *pl. 1.* 1843; 23.

Branches, branchlets and petioles stout, the latter only a few mm. long, wing-margined above by the decurrent cuneately based obovate leaves, these 2.5 to 4 dm. long or longer, 8–14 cm. wide, conspicuously reticulate-nervose beneath; stipules caducous, 3–5 cm. long; bracts 3–7 mm. long, long-acuminate; calyx segments lanceolate, 6–6.5 mm. long; petals 5.5 mm. long the lateral auricles three times longer than posterior; stamen cup crenate; long styles 4.5 mm. long, stigma broader than styles.—One to ten meter tree with white or greenish flowers, rarely yellow (Klug); leaves at summit, flowers on stem below them (Killip & Smith).

San Martín: Pongo de Cainarachi, *Klug 2738* (det. Standley, *E. amplum*).—Junín: Puerto Yessup, *Killip & Smith 26375* (det. Standley, *E. amplum*).—Huánuco: In woods, Cuchero, *Poeppig 46*.—Loreto: Yurimaguas, at edge of woods, *Poeppig 1760; 2166; Williams 4039; 4149; 4356; Killip & Smith 29081* (det. Killip). On the Marañón, *Tessmann 5053*. Santa Ana on the upper Río Nanay, *Williams 1230*. Río Putumayo, Peru-Colombia boundary, *Klug 1616* (det. Standley, *E. amplum*). Iquitos, *Tessmann 5351; 5053*. Mouth of Río Santiago, *Tessmann 4244*. "Maggisapa" (Klug).

Erythroxylum macrophyllum Cav. Diss. 8: 401. *pl. 227*. 1789; 25.

With the stout branches and branchlets of *E. macrocnemium* but the broad calyx segments of the closely related *E. lucidum* (apparently only a variety) from which it may differ otherwise as follows: petioles 7–12 mm. long; stipules 7–21 mm. long, minutely 3-setulose; leaves typically obtusish or shortly acute, 12–23 cm. long, 5–12 cm. wide, lateral nerves more obvious beneath; flowers 12–18 (25), calyx segments (2) 4–4.5 mm. long, acuminate, petals 4.5 mm. long, lateral auricles thrice longer than posterior, stamen cup and ovary equal in short-styled flowers.—Illustrated, Schulz, 26. F.M. Neg. 29348.

San Martín: Tarapoto, *Williams 6591; 6585*.—Huánuco: Tingo María, 700 meters, *Stork & Horton 9476* (det. Standley).—Loreto: Pampa del Sacramento, *Castelnau*. Pamayacu, *Klug 3185* (det. Standley).—Río Acre: Seringal Auristella, *Ule 9473* (det. Dahlem).—Cuzco: Cosñipata, *Weberbauer 6962* (apparently toward *E. lucidum*). To the Guianas. "Yutabanco."

Erythroxylum Mamacoca Mart. Beitr. Kenntn. Erythrox. 1840; Abh. Math. Nat. Cl. Akad. Muench. 3, pt. 2: 365. 1843; 79.

Shrub with slender branches that are obscurely verruculose and erect-spreading branchlets that are little compressed, 1.5 mm. wide;

stipules persistent, triangular, 1.5–2 mm. long, broadly bicarinate, estriate, shortly trisetulose at the rounded tip, crowded at base of innovations and between leaves; petioles (3) 3.5–6 mm. long; leaves oblong-elliptic, sometimes broadly so, acutish or subrotund at base, rather obtusely acuminate, 6–10 cm. long, 3–4.5 cm. wide, chartaceous, diaphanous, grayish-green above, brown beneath, somewhat lustrous both sides, the midnerve thick and obtuse beneath, the lateral nerves not conspicuous above but prominent and reticulate beneath; flowers 1–3 on pedicels enlarged and 5–6 mm. long in fruit; calyx lobes 1.2 mm. long; stamen cup little longer than calyx, 10-crenate; drupe 14 mm. long, 5 mm. broad, 4 mm. thick, ellipsoid, obtusish.—Leaves darken in drying. The name said to be for the wife of the king Mayta-Capac. F.M. Neg. 12628.

Huánuco: In mountains near Pillao, *Ruiz.* Hacienda San Antonio, *Raimondi.* Cuchero, in stony woods, *Poeppig 1760.*—Loreto: Yurimaguas, *Williams 4639; 4664.* Near Iquitos, *Williams 8049.* "Mama-cuca," "motelo-caspi" (Williams).

Erythroxylum paraense Peyr. in Mart. Fl. Bras. 12, pt. 1: 164. *pl. 30.* 1878; 35.

Shrub or small tree with slender terete branches, the bark gray lenticellate, obscurely verruculose; branchlets erect-spreading, compressed, to 2 mm. broad; stipules finally deciduous, lanceolate, 2.5–5 mm. long, obtuse, 3-setulose, striate, membranous, loose at base of innovations; petioles 5–6 mm. long; leaves oblong-elliptic, narrowed or subrounded at base, plicate and mucronulate at the acuminate apex, 6 (5)–12 cm. long, about 2–4 cm. wide, long lines subareolate, chartaceous, diaphanous (ex char.), lustrous and gray green above, rather opaque and rusty beneath, the midnerve and subhorizontal lateral nerves little prominent both sides, obscurely reticulate; flowers 3–14; pedicels 2–4.5 mm. long, not enlarged; calyx lobes 1–1.2 mm. long, acute; petals 3 mm. long, ligule half as long, claw one-third of blade; lateral auricles little longer than posterior; stamen cup in short-styled flowers about as long as calyx, entire or 10-crenulate, stamens 3 mm. long, ovary ovate, style 1 mm. long, the stigma a little broader.—*E. amazonicum* Peyr., 34, has leaves 6–12 cm. long, 3–6 cm. wide, obovate, coriaceous, not pellucid, pedicels strongly enlarged, drupes 12–16 mm. long; it may be as near *E. amplum.* All of the Peruvian specimens (at least) perhaps should be included in a somewhat more broadly defined *E. acuminatum.*

San Martín: Tarapoto, *Ule 6437; Williams 6319; 6325; 6614; 6672; 6673.* Near Moyobamba, 900 meters, *Weberbauer 4524; Klug 3258* (det. Standley). Amazonian Brazil; Bolivia. "Puca-llaja."

Erythroxylum Raimondii O. E. Schulz, Notizbl. Bot. Gart. Berlin 10: 727. 1929.

Branchlets compressed toward tips, 2.5 mm. in diameter, densely leafy, the blackish bark verruculose-lenticellate; stipules persisting, 3 mm. long, striate, subfimbriate, shortly bisetulose; petioles stout, 2–3 mm. long; leaves elliptic, rounded at base, lightly emarginate at the mucronulate tip, at maturity 6–9 cm. long, 3–4.5 (5) cm. wide, subcoriaceous, scarcely revolute, brownish above, subglaucescent beneath, the approximate nerves reddish and conspicuously reticulate; pedicels slender, to 3 mm. long; calyx segments distinct, narrowly ovate, acutish, 1 mm. long; petals 2.5 mm. long, the ligule half as long; staminal cup shorter than calyx; fruit unknown.—Allied to the more northern *E. rufum* Cav. but the petioles shorter, the leaves rounded at base. *E. opacum* Rusby and *E. venosum* Rusby, both Mem. N. Y. Bot. Gard. 7: 270. 1927 of Bolivia, could not be this plant; the first, ex char., has leaves acute both ends (stipules estriate) and in the latter they are smaller (Schulz) but smaller leaves may be no character; flowers from Cook & Gilbert not dissected. It seems to be nearer *E. passerinum* Mart. than *E. rufum* and, like certain other species, simulates some with estriate stipules. F.M. Neg. 12641.

Cuzco: Santa Ana, Prov. Convención, *Raimondi*, type; also *Cook & Gilbert 1463.* "Coca-coca," "coco-coco."

Erythroxylum Shatona Macbr. Candollea 5: 371. 1934.

Glabrous, the stout branchlets densely verruculose and lenticellate; stipules persisting, not at all striate, obscurely if at all setulose, 4 mm. long; petioles 3–4 mm. long; leaves ovate-elliptic, shortly acute, 7–10 cm. long, 3–5 cm. wide, coriaceous, slightly lustrous both sides, glaucous green above, the veins obscure, slender midnerve impressed, beautifully areolate, long lines conspicuous, brown beneath in herb.; flowers few; pedicels about 3 mm. long; calyx segments narrowly ovate, 2 mm. long; styles apparently connate; drupes oblong-ellipsoid, subangulate, acutish, 12 mm. long, 3.5 mm. thick.—Perhaps related to *E. carthagenense* Jacq., 87, of Colombia but distinguishable, apparently, by its shortly pointed leaves. Among Peruvian species it most resembles *E. gracilipes* with thin

and acuminate leaves. The somewhat related *E. Ruizii* Peyr., 90, of Ecuador, has smaller submembranous leaves very lustrous beneath, shorter stipules, longer pedicels.

San Martín: Tarapoto, Río Maya, *Williams 6212*, type. "Shatona colorado."

Erythroxylum Tessmannii O. E. Schulz, Notizbl. Bot. Gart. Berlin 9: 263. 1925.

Much-branched shrub the brownish branches long-lenticellate, the erect-spreading branchlets 1–2 mm. across; stipules 1.2 mm. long, estriate, persisting, shortly 3-setulose; petioles 2–3 mm. long; leaves oblong-elliptic-lanceolate, narrowed both ends, less so toward the obtuse tip, 4–7 cm. long, 10–18 mm. wide, chartaceous, diaphanous(?), gray-green and lustrous above, opaque and glaucous beneath, the slender midnerve conspicuous both sides, the lateral nerves loosely reticulate; flowers 1–3, in axils of leaves and branchlets; pedicels 2–4 mm. long; bracts ovate, acute, 1–1.5 mm. long; calyx segments ovate, acute, 0.75 mm. long; petals 3 mm. long, ligule half as long, white with green tips; stamen cup as long as sepals in long-styled flowers, the stamens 1 and 1.8 mm. long, styles 3 mm. long.—Near *E. exaltatum* Bong. var. *ellipticum* (Peyr.) O. E. Schulz, 104, of southern Brazil, but leaves narrower, tip not at all acuminate, opaque beneath, stipules, pedicels and flowers smaller (Schulz); the narrow elongate leaves obtusely acuminate distinguish it from *E. Coca*. It is possibly a variant of Bongard's species but the firmer leaves are obviously opaque beneath and, while narrowed apically, are obtuse at the tip; doubtfully distinct too from *E. lenticellosum* Huber, Bol. Mus. Goeldi 5: 420. 1909, this with rather similar foliage but with longer subciliate stipules, pedicels (in type) 5–6 mm. long. F.M. Neg. 12551.

Loreto: Rocky shores, middle Aguaytia on the Ucayali, *Tessmann 3163*, type.

Erythroxylum Ulei O. E. Schulz, Pflanzenreich IV. 134: 62. 1907.

A 1–5 meter shrub or tree, the branches with brown, evidently verruculose bark and about 3 mm. thick, the erect-spreading little compressed branchlets about 1.5 mm. broad; stipules persisting, triangular, obtuse and very shortly 3-setulose, obscurely and sparsely striate, 1.5–2 mm. long, lax at base of innovations and between the

leaves, these with petioles 2–3 mm. long, the blades narrowly ovate (apparently usually broadly so) or elliptic, somewhat acute, the obtusish tip obscurely mucronulate, the base slightly acute, about 3.5–8 cm. long, 1.5–4 cm. wide, chartaceous, diaphanous, gray-green and somewhat lustrous above, more or less rusty and opaque beneath, the lateral nerves obvious both sides, densely reticulate-nervose; flowers 1–3, the little enlarged pedicels 1–4 mm. long; bracts setulose, ovate, 1.2 mm. long; calyx segments 1.5 mm. long, broadly lanceolate; petals 3.5 mm. long, the ligule half as long, the lateral auricles twice longer than the posterior; stamen cup (short-styled flowers) shorter than calyx, entire, stamens 3.2 mm. long, style 1 mm. long, the stigma as wide; drupes 7.5 mm. long, 3.5 mm. broad, ovate, acute, subcurved.—The recent collections cited are somewhat aberrant, the leaves soon subcoriaceous, mostly broadly elliptic, rounded or scarcely at all acute. F.M. Neg. 12653.

San Martín: Tarapoto, *Ule 6346; Williams 6444.* Tocache, in dry mountain woods, *Poeppig.* Without data, (*Mathews 680; 2022*).—Junín: La Merced, *5408.* Colonia Perené, *Killip & Smith 25073.* Between the Huallaga and Pizana, *Raimondi.*—Cuzco: Santa Ana, *Cook & Gilbert 1698.* Bolivia; Colombia. "Monte cuca."

ZYGOPHYLLACEAE R. Br.

Shrubs, half-shrubs, rarely trees or herbs, with nearly the floral and fruit-characters of the closely related Rutaceae but the opposite or alternate leaves with persisting often spinescent or noduliform stipules and without pellucid punctae. Stamens usually 2, sometimes 3 times as many as the petals. Ovary commonly 4–5-celled, rarely 2–12. Fruit various, ordinarily capsular and composed of few to many parts, conveniently at least termed follicles, carpels or nutlets.—Descole, O'Donell and Lourteig, Lilloa 5: 258. 1940, have distinguished the tribes of the family by the nature of the pollen grains; I am indebted to them for this character, and I have compiled generally from their careful synopsis of the species of Argentina. Their illustrations, as cited, are repeated in Descole, Gen. & Sp. Argent. 1. 1943.

"Lignum vitae," popularly known as one of the hardest woods, is an American species of *Guaiacum;* it is not found in Peru but it has a counterpart it is said in the wood of *Porlieria* which I found greatly prized about Huánuco for the manufacture of small articles, such as combs and spoons.

Carpels spiny or beaked; endosperm absent; pollen superficially reticulate with a pore in each cavity; herbs or little ligneous.

Fruits radiate, 5-parted, spiny or winged; ovary developing transverse septa.....1. *Tribulus.*

Fruit convex, (5) 8–12-parted, espinose; ovary without septa. 2. *Kallstroemia.*

Carpels not beaked or spinose; endosperm present; pollen smooth or granulate with 3 pleats and 3 pores; often ligneous or partly.

Leaves digitately 3–5-foliate; stamens unappendaged; half shrubs. 3. *Fagonia.*

Leaves pinnate (leaflets rarely reduced to 2); stamens appendaged; shrubs.

Leaves pinnate; carpels alate or glabrous.

Petals yellow; carpels compressed, alate.....4. *Bulnesia.*

Petals blue; carpels 3, globose, glabrous.....5. *Porlieria.*

Leaves bifoliate or nearly; fruits 5 villous nutlets...6. *Larrea.*

1. TRIBULUS [Tourn.] L.

Mostly prostrate herbs with pinnate, usually opposite, leaves, membranous stipules and solitary flowers on axillary peduncles. Sepals and petals 5; stamens twice as many, the filaments unappendaged, the 5 episepalous sometimes sterile. Ovary 5-celled (cells 3–5-ovuled), terminating in a columnar stigmatic body, the flat fruit composed of 5 carpels or nutlets each of them usually spinescent or winged leaving no central axis when falling.—The name is thought to have been suggested by the fancied resemblance of the carpels to an ancient 3-pointed tool.

Tribulus terrestris L. Sp. Pl. 387. 1753.

More or less sericeous pubescent annual, the leaves with 6 (5–7) pairs of oblong mucronate leaflets 7–13 mm. long, 4–7 mm. wide, and typically longer than the peduncles; sepals caducous; petals yellow or lemon-yellow, 4–5 (7) mm. long; carpels ordinarily with 2 strong spines on each one, sometimes with 3 or 4, some smaller ones, also tubercled and somewhat pubescent.—According to Svenson the Peruvian plant is var. *sericeus* Andersson and varies from densely hirsute to sparsely pilose. To be expected sooner or later as another introduction is *T. cistoides* L. perhaps a variant but said to be more erect, perennial, peduncles half as long to longer

than the leaves, these somewhat larger, and petals much larger, at least 1.5 cm. long; *Weberbauer 5943* was so determined by Krause, apparently intermediate in character. The fruiting spines are so hard that they may puncture bicycle tires. Only a few recent authors have sacrificed tradition for erudition (their own, at any rate) by "correcting" Linnaeus' name to "terrester" contrary to euphony. Introduced from southern Europe. Illustrated, Lilloa 5: 261; Amer. Jour. Bot. 33: 456.

Piura: La Brea, (*Haught & Svenson 11568*). Near Piura, *Weberbauer 5943*.—Cajamarca: Cascas, *Raimondi*.—Lima: Street in Chosica, *Mexia 04086*.—Huánuco: Near Huánuco, *2059; 2337*.—Apurímac: North of Abancay, *Goodspeed Exped. 10540*.—Moquehua: At 2,000 meters, *Weberbauer 7437*. Widely spread from southern Europe.

2. KALLSTROEMIA Scop.

Similar to *Tribulus* but the fruit consisting of 8–12, rarely 5, merely tuberculate usually 1-seeded follicles that separate at maturity from the more or less persisting styliferous central axis. Ovary without transverse septa. Stigma capitate.—The origin of the name is personal, Kallstroem.

Kallstroemia adscendens Andersson, K. Sw. Freg. Eugen. Resa. Bot. 245. 1854. *K. tucumanensis* Descole, O'Donell & Lourteig, Lilloa 4: 218. *pl.* p. 219. 1939, fide Svenson, Amer. Jour. Bot. 33: 457. 1946.

A prostrate or diffuse annual the branching stems more or less finely pubescent and somewhat hirsute; leaves with 3 (2) pairs (rarely 4?) of obliquely elliptic obtusely rounded slightly mucronate leaflets, appressed pubescent beneath, mostly 1–2 cm. long, 5–9 (13) mm. wide; peduncles 1–2 cm. long; sepals lanceolate, hirsute; petals white (or pale yellow?), obovate, 5 mm. long; fruit appressed strigose, 7–8 mm. long, the conic broad beak about as long as the body, the follicles tubercled dorsally, usually reticulate laterally.—This disposition of the Haught specimens follows Svenson, l.c.; in Field Mus. Bot. 8: 119. 1930 I suggested that more collections are needed to establish the significance of the characters now regarded in the genus as specific and thought that the Peruvian plant might be a form of *K. caribaea* Rydb. N. Amer. Fl. 25: 111. 1910 of the West Indies and Colombia, similar but with narrower sepals, petals 6–7 mm. long; revision of the genus is needed. Illustrated, Lilloa 5: *pl. 2*, opposite page 266.

Piura: Near Piura, *Haught 161; 51;* (*147*). Galapagos; Ecuador; Argentina(?).

Kallstroemia maxima (L.) T. & G. Fl. N. Amer. 1: 213. 1838. *Tribulus maximus* L. Sp. Pl. 386. 1753. *K. tribuloides* (Mart.) Wight & Arnott, Prodr. Fl. Ind. Or. 145. 1834, by inference. *Ehrenbergia tribuloides* Mart. Nov. Gen. & Sp. 2: 73. *pl. 163.* 1826?

Similar in general as defined here (sens. lat.) to *K. adscendens* but leaves with mostly 4 (3–6) pairs of leaflets, sepals narrow, petals yellow, 7–8 mm. long, carpels glabrous but tubercled, or, including the above, sepals narrowly ovate, petals orange, 9–11 mm. long, carpels smooth and glabrous; character in general, stems more or less sericeous and pubescent, leaflets mostly 1.5–2 cm. long, 5–13 mm. wide, sepals acuminate, hirsute-pilose, petals about as wide at tip as long.—The Peruvian material differs from both the above variants in having strigillose carpels, thus approaching *K. boliviana* Standl. Field Mus. Bot. 11: 161. 1936 but that as to type with petals 12–18 mm. long, fruit 8–10 mm. long, and also *K. brachystylis* Vail, of southwestern United States; at least some specimens from Argentina referred here have strigillose carpels; cf. too *K. adscendens.* Until there is a generic revision, probably of necessity based upon or made with the aid of genetic studies, it seems just as well to treat the Peruvian plants under one perhaps aggregate name, nevertheless understandable, with this explanation. It may be noted that Wight & Arnott, l.c. wrote: "*Kallstroemia* Scop. (containing *Trib. maximus* Lin. and *Ehrenbergia tribuloides* Mart.) differs," etc.

Weberbauer found the plant used for stock at Mantaro as "jepo."

Cajamarca: Near Jaén, *Raimondi.*—Lima: East of Sayán, Prov. Chancay, *Goodspeed 33036* (det. Leonard). On the railroad at 1,300 meters, *Weberbauer 5265.* Matucana, *396.*—Huánuco: Near Huánuco, *2355.* Ambo, flowers orange, *Stork 11444* (det. Johnst.).—Apurímac: Carpeting sandy places, flowers yellow, *Goodspeed Exped. 10527.*—Huancavelica: Mantaro, 1,300 meters, *Weberbauer 6516* (det. Mansf., *K. tribuloides*).—Cuzco: Sandy rocky slopes, Chuyani, *Vargas 9725* (det. Standl.). Valle de Apurímac, Hacienda Huantaro, *Bues 758* (det. Herrera, *K. tribuloides*). Widely distributed. "Jepo."

3. FAGONIA [Tourn.] L.

Reference: Johnston, Proc. Calif. Acad. Sci. ser. 4. 12: 1049–1053. 1924.

Much branched, more or less woody at base, sometimes shrubby, with opposite branches and opposite simple or digitately 3-foliate leaves, often spinescent stipules and solitary usually roseate or purplish flowers. Sepals and petals 5, caducous. Stamens 10, filaments unappendaged. Style subulate, stigma simple. Ovary 5-celled, with 2 ovules in each cell near the base. Fruit composed of 5 1-seeded carpels that finally separate along the inner edge.—Named for G. C. Fagon, French botanist of the seventeenth century.

Fagonia chilensis Hook. & Arn. in Hook. Bot. Misc. 3: 165. 1833; 1049. *F. aspera* Gay, Hist. Nat. Chile 1: 470. 1845.

Typically glabrous except for some scabrosity on the fruit; branches diffuse, repeatedly dichotomous, angled; stipules spinescent, stout, 2–4 mm. long, 2–3 times shorter than the petioles; leaflets 3, obovate to linear-lanceolate, acute or acuminate, spine-tipped, 2–8 mm. long, 2–3 mm. wide, the lateral often oblique; pedicels 3–4 mm. long, deflexed, shorter than the fruits; sepals oblong-lanceolate, 3–4 mm. long, acute; petals pink, 6–8 mm. long; fruit about 5 mm. high, a little scabrous, beak 2–3 mm. long. (After Standley.)—The variant *aspera* (cf. Johnston, l.c. 1051) is typically more or less scabrous; the Peruvian plant is lightly pilose-pubescent, the loose trichomes rather dense, especially on the fruits; leaflets 2–4 mm. wide and may be worth designating var. **pubecarpa** Macbr., var. nov., carpellis dense pilosciusculis, circa 4 mm. latis; pedicellis ad 7 mm. longis; *Weberbauer 7431*, type. The Chilean species was treated at one time by Engler as a variety of the Mediterranean *F. cretica* L. which has fruits about 7 mm. wide and has recently been referred to by Johnston as "a species doubtfully separable," but this author earlier, l.c., followed Standley, Proc. Biol. Soc. Wash. 24: 244. 1911, who pointed out that all the American plants have noticeably smaller fruits. The American plants furthermore are extremely variable vegetatively but nevertheless relatively constant in size of the fruit and probably constitute one species, at least within Peru.

Lima: Near Obrajillo, *Wilkes Exped.* Near San Bartolomé, *Weberbauer 5268.* Hillside above Santa Eulalia, 1,500 meters, *Goodspeed 33093.*—Moquehua: Near Moquehua, *Weberbauer 7431* (type, var. *pubecarpa*). Chile; California?

4. BULNESIA Gay

Trees or shrubby, the numerous upper branchlets sometimes (in Peru) leafless or nearly except at time of flowering and from this

character as well as from habit of growth often broomlike in appearance. Sepals and petals 5, the former deciduous, the latter longer, clawed. Stamens 10, with long dentate or lacerate appendages. Capsule 3–5-celled, the fruit generally consisting of 5 broad winged 1-seeded carpels each of which dehisces by a ventral suture.

The flowers are suggestive of *Cassia*. Genus named for Bulnes, a Chilean president (1841), soldier and statesman.

Bulnesia Retama (Gillies) Griseb. Pl. Lorentz. 58. 1874. *Zygophyllum Retama* Gillies, ex Hook. Bot. Misc. 3: 166. 1833.

Typically a tree or tree-like shrub with early pubescent terete brittle branchlets from which the small leaves, borne at the flower buds, are strongly caducous; internodes 3–10 mm. long; leaflets 2–4 pairs, oblong, mucronulate, appressed pubescent, rare or lacking after floration, to 5 mm. long, 3 mm. wide; stipules ovate, acute, 2 mm. long; flowers about 2, dichasial at each node, peduncles 6–8 mm. long, pubescent; sepals glabrate, 5–7 mm. long, 3–6 mm. wide; petals obovate, 7–8 mm. long, 4–5 mm. wide; stamen appendages deeply ciliate-lacerate; ovary glabrous; fruit 5-winged, 3 cm. long, 2.5 cm. wide.—The Peruvian plant is var. *Weberbaueri* Engler, a shrub to 3 meters high with long internodes, 2–3 pairs of thick oval leaflets 2 mm. wide, 3 mm. long, found at the edge of the *Prosopis juliflora* formation.—Illustrated, Lilloa 4: 287 (drawing; also *pls. 8, 9*, photos of type spec. and of a tree).

The wood is hard and useful; a tea prepared from the flowers of the variety is used locally in the treatment of gonorrhoea (Weberbauer).

Ica: Toward Hacienda Ocucaje, 360 meters, *Weberbauer 7193; 7196a.* Between Otoca and Ingenio, 1,050 meters, *Weberbauer.* Also, *Raimondi.* Argentina. "Calato" (Weberbauer), "retamo."

5. PORLIERIA R. & P.

Rigid shrubs with stout branches on which the opposite pinnate leaves of many leaflets are borne so as to spread open toward the light, closing in cloudy weather. Stipules small, spinescent. Flowers 1–3, short-peduncled in the leaf-axils. Sepals and petals 4 (5), imbricate in bud. Stamens 8–10, the filaments enclosed in a short or long divided or serrate sheath or appendage. Ovary 2–5-celled with 2–5-sulcate style, simple stigma, the ovules 4 in superimposed pairs in each cell. Fruit coriaceous, 1-seeded.—Genus commemorates Don Antonio Porlier, a government nobleman (marquis) who

aided the authors in their work. I retain the original spelling, R. & P. Prodr. 55. *pl. 9.* 1794.

The wood is said to be like true lignum vitae (*Guaiacum* sp.).

Porlieria hygrometra R. & P. Syst. Veg. 94. 1798.

Stocky intricately branched shrub with many short branchlets; leaves with 6–8 pairs of oblong leaflets 5–8 mm. long, 2 (1.8)–3 mm. wide, more or less loosely pubescent, especially toward the margins, or ciliate, glabrate; peduncles about 2 mm. long (apparently sometimes to 10 mm. long in fruit), like the flower-buds densely fulvous pubescent; sepals 3 mm. long, the petals a little longer; filaments margined toward base; drupes, according to authors, (3) 4, oblong, gibbous, connate.—In Chilean material they may be 8 mm. long. Type material from Huánuco and Chile; it is possible that there is only one variable species, but see *P. chilensis* Johnst. Journ. Arnold Arb. 19: 253. 1938, leaflets 5–7 pairs, ovary sparsely villous. The broad leaflets and large angled fruits of Chilean material are contrasts to the mature globose dull-black small (4–5 mm. thick) fruits of specimens from central Peru and the similar in size but brown and lustrous fruits of *P. microphylla,* see below. It is noteworthy that undeveloped fruits of the last are distinctly angled, and that possibly, as regards this feature, there is considerable change when the fruit matures. Other names proposed are: *P. arida* Rusby, Mem. Torrey Club 6: 15. 1896 and *P. Steinbachii* Standl. Field Mus. Bot. 11: 162. 1936, this with ciliate rather broad leaflets (15 pairs), glabrous ovary. Illustrated, R. & P. Fl. Peruv. 4. *pl. 343.*

Piura: Huancabamba, *Weberbauer 6286.*—Cajamarca: Cascas, *Raimondi.*—Ancash: *Raimondi.*—Ayacucho: Prov. Huanta, *Raimondi.*—Huánuco: Pampayacu, *Sawada P53.* Hacienda San Roque, 1,800 meters, *Soukup 3107.* Near Huánuco, *2382; 3221; Dombey; Ruiz & Pavón,* type. Chulki, *Sawada P127.* Argentina? Bolivia? Chile? "Murucho."

Porlieria microphylla (Baillon) Desc., O'Don. & Lourt. Lilloa 5: 329. 1940. *Guaiacum microphylla* Baillon, Adansonia 10: 315. 1872. *P. Lorentzii* Engler, Pflanzenfam. 3, 4: 84. *fig. 51.* 1897.

Drupes nearly globose, about 4.5 mm. thick, lustrous, light brown; leaflets 5–20 pairs, 4–7 mm. long, 1–1.3 mm. wide, obtuse, appressed pubescent beneath; flowers 1 or 2, pubescent peduncles about 1 mm. long (to 4 mm. in fruit); sepals ovate, 2.5–3 mm. long, filaments winged nearly to the sagittate anthers.—After Descole,

O'Donell & Lourteig; Johnston has suggested that the species is the same as that of Ruiz & Pavón and at least for Peru that is probably the case as my note made in Dahlem for *Weberbauer 3741* reads "rather *P. hygrometra*?" F.M. Neg. 12657. Illustrated, Lilloa 5: 331.

Ancash: High steppes with cacti, shrubs, annual grasses, 2,500 meters, Puccha Valley, Prov. Huari, *Weberbauer 3741* (det. Harms, *P. Lorentzii*); 174. Argentina; Bolivia. "Cucharero," "chukupi" (Argentina).

6. **LARREA** Cav.

Resiniferous evergreen shrubs with persisting stipules and opposite sometimes pinnate leaves but these in Peru with only 2 slightly connate spreading leaflets. Flowers yellow, solitary on short terminal (pseudoaxillary) peduncles with 5 deciduous imbricate sepals and petals and 10 stamens, the filiform filaments surrounded by variously dentate or cleft basal scales. Ovary shortly stiped, globose, hirsute-pilose, 5-celled, attenuate into a subulate somewhat 5-parted style with minute stigmas; ovules pendulous. Fruit villous, consisting of 5 indehiscent 1-seeded nutlets.—The conserved name honored Juan Antonio Hernández de Larrea, Deán de Zaragoza.

Larrea divaricata Cav. Anal. Hist. Nat. Madrid 2: 122. *pl. 19.* 1800. *Covillea divaricata* (Cav.) Vail, Bull. Torrey Club 22: 229. 1895. *Schroeterella divaricata* (Cav.) Briquet, Veröff. Geobot. Inst. Rübel. 3: 663. 1925. *Neoschroetera divaricata* (Cav.) Briquet, Candollea 2: 514. 1926.

Younger angulate branchlets and leaves more or less appressed ashy pubescent; stipules noduliform, not at all foliose; leaflets diverging from the slightly connate base with a short mucro between them, striately nerved, mucronulate, oblongish, nearly straight, 7–8 (15) mm. long, 2.5–3 (4.5) mm. wide; sepals pubescent, concave, obtuse, obviously unequal, 4–6 mm. long, 3–4 mm. wide; petals 4–8 mm. long or larger; filament scales variously dentate, 6 or 7 mm. long; fruits globose, villous-hirsute, easily separating into 5 nutlets.—This is the typical shrub of Argentina to which the Peruvian material was referred in Dahlem, probably correctly. A tea is prepared from the plant for pulmonary disorders (Weberbauer). Illustrated, Lilloa 5: 309.

Arequipa: Valle de Mages, Aplao, 1,000 meters, *Weberbauer 6845; Raimondi.* To Argentina. "Yarilla," "chamanilla," "jarilla."

RUTACEAE Endl. Citrus Family

Reference: Engler in Mart. Fl. Bras. 12, pt. 2: 77–196. 1874.

Glandular punctate usually pungently odorous shrubs trees or rarely herbs with estipulate often opposite leaves that may be simple but are ordinarily 1–7-foliate or pinnate, sometimes bi- or tripinnate, the leaflets commonly but not always entire, the petioles now and then glandular or modified at base, the flowers mostly cymose and axillary, frequently perfect but not always regular especially if the petals are more or less connate. Anthers versatile or adnate the connective often glandular, sometimes extended or appendaged, the filaments rarely squamate. Disk variously developed, infrequently wanting. Carpels connate in greater or less degree, even free, or solitary, the baccate or rarely drupaceous fruit 4–5-celled, the cells or carpels usually 1-seeded and ordinarily elastically bivalved the endocarp often adhering to the seed and falling with it. Albumen none or fleshy.—The berry or orange type fruits are a special development within the scope of this highly diversified family.

A complete account of citrus fruits is available in The Citrus Industry; History, Botany, and Breeding; editors, Webber & Batchelor (taxonomy, W. T. Swingle) 1: 1943; also Citrus Products, McNair, Field Mus. Bot. 6: 1926–1927.

Two of the largest Amazonian trees belong to this family but have not yet been found within Peru: *Hortia Vandelli* has an egg-shaped stone fruit which presumably allies it to *Amyris* but it has long narrow anthers, simple leaves, 5-merous flowers with pubescent petals, 5-lobed disk, the wood, according to Ducke similar to that of "Poa amarello" which compare below under *Adiscanthus;* native name "Cachaceiro"; *Sohnreyia* Krause is an equally distinctive tree but by reason of its ample leaves with many narrow leaflets and its winged fruits.

Leaves simple or simply parted, sometimes unifoliate; carpels, except *Citrus*, 1–2-seeded.

Stamens many; fruit orange-like.....1. *Citrus.*

Stamens 3–10; fruit usually dry, rarely a berry or drupe.

Anthers often as broad as long, ovate, broadly elliptic, sometimes cordate; petals and stamens free.

Stamens 6–10; fruit a berry or drupe; leaves (Peru) pinnate; flowers usually perfect.

Fruit a berry; flowers large.....2. *Murraya.*

Fruit a drupe; flowers small.....3. *Amyris.*

Stamens 3–5 (–8) or wanting in female flowers; fruit dry.

Disk short or obscure; stamens or styles wanting or reduced; carpels glandular-punctate; leaves usually pinnate. 4. *Zanthoxylum.*

Disk annulate or cupulate; flowers perfect; carpels rugose or aculeate, rarely smooth; leaves simple or 1–7-foliate.

Flowers in panicles, often racemiform; ovary usually tubercled; fruit a ligneous capsule of 4–5 often radiate parts.

Petioles opposite or in 3's, dilated and often appendaged at base.....5. *Metrodorea.*

Petioles usually alternate, unappendaged. 6. *Esenbeckia.*

Flowers spicate or racemose; ovary smooth; fruit 1–5, often basally united carpels.....7. *Pilocarpus.*

Anthers often longer than broad, linear-lanceolate or narrow; petals usually united at least at base; stamens rarely all entirely free.

Calyx lobes or sepals equal or uniseriate.

Petals and stamens both free; disk lacking.8. *Adiscanthus.*

Petals at least basally or medially connate; disk present.

Flowers 4-merous; stamens free.....9. *Leptothyrsa.*

Flowers 5-merous; stamens at least lightly affixed in part.

Flowers regular, with long tube; stamens nearly all completely free, rarely all fertile.....10. *Ticorea.*

Flowers somewhat irregular; stamens never all completely free, rarely all fertile.

Calyx colored, large; stamens nearly completely attached; fruit-parts 2-seeded. 11. *Erythrochiton.*

Calyx small, green, stamens more or less free; fruit-parts 1-seeded, tardily separating except *Cusparia.*

Stamens somewhat coalescent and joined to long corolla-tube, the anthers appendaged. 12. *Galipea.*

Stamens unappendaged; petals nearly free or shortly united.

Petals only basally connate; filaments lightly affixed; carpels tardily free....13. *Rauia.*

Petals connate into short tube; filaments affixed medially; carpels free from first, or reduced to 1.....14. *Cusparia.*

Calyx lobes very unequal or foliate.

Tubular corolla concealed in calyx; herb or half-shrub. 15. *Monnieria.*

Funnelform corolla exserted; shrubs or trees...16. *Ravenia.*

Leaves bi- or tripinnate; carpels each with 3 or more seeds.

Glaucous herb or half-shrub.....17. *Ruta.*

Ashy pubescent shrub.....18. *Dictyoloma.*

1. CITRUS L.

Reference: Swingle, The Citrus Industry 1: 129–474. 1943.

Small trees, the younger branchlets angled but soon terete with single spines in the leaf-axils, these often lacking later. Leaves 1-foliate; lateral veins few and without conspicuous veins beneath, the petioles usually more or less winged and articulated with the blade, except in *C. medica.* Flowers solitary or in short axillary corymbose racemes, perfect or staminate. Calyx cupulate, 4–5-lobed, petals 5 (4–8), thick, linear, gland-dotted, imbricate in bud. Stamens usually about four times as many as the petals, sometimes many more. Disk annulate. Ovary cells 10–14 (8–18) with 4–8 or more ovules in each cell in 2 collateral rows. Style cylindric, abruptly expanded into the globose or oblate-sphaeroid stigma (after W. T. Swingle, The Citrus Industry 1: 386. 1943). His excellent description of the fruit is as follows: fruit a hesperidium with the segments containing seeds near the inner angle and the rest of the space filled with stalked fusiform pulp-vesicles, filled with a very watery large-celled tissue; around the segments is a white endocarp outside of which is the peel, dotted with numerous oil glands and turning yellow or orange at full maturity; seeds obovoid or flattened obovoid, more or less angular, containing 1 or many embryos, either white or green. In young developing fruits short-stalked club-shaped slime-secreting organs develop rapidly with the pulp-vesicles; these soon mature and liberate slimy matter which probably enables the developing pulp-vesicles to slide freely over one another.

The remarkable genus *Rhabdodendron* Gilg & Pilger of the Amazonian region would be sought here on account of its numerous stamens with long slender anthers; the calyx is reduced to a rim of the fleshy conical pedicelled axis, petals caducous, style from base of ovary, fruit firm, ovoid, sessile in the axis, with 1 seed; the known species are *R. macrophyllum* (Spruce) Huber and *R. amazonicum* (Benth.) Huber, the leaves of the former with very prominent nerve, this obsolete in the leaves of the latter.

Williams as myself found sour and sweet oranges persisting after cultivation had been abandoned; he also collected *C. reticulata* Blanco, the Mandarin orange, as an escape at Pebas, where known as "Tansharina."

Citrus fruits were introduced into Peru by the Spanish. Garcilaso de la Vega was quoted as saying in 1609: "All these fruits grow there today in abundance." They are still however mostly if not entirely absorbed by the local markets. Key and descriptions after Swingle, l.c.; determinations by Standley.

Petioles wingless; flowers perfect or often male.....*C. medica.*

Petioles winged, clearly articulated with the blade.

Stamens usually more than 4 times petals; flowers perfect, often male; petiole wings very narrow.....C. *Limon.*

Stamens usually 4 times petals; flowers usually perfect.

Fruits usually 4–6 cm. in diameter, yellowish-green; petiole wings narrow.....*C. aurantifolia.*

Fruits usually 5–9 cm. in diameter, scarlet-orange; petiole wings broad.....*C. Aurantium.*

Citrus aurantifolia (Christm.) Swingle, Journ. Wash. Acad. Sci. 3: 465. 1913; 401. *Limonia aurantifolia* Christm. in Linn. Pflanzensyst. 1: 618. 1777.

Branchlets with short stiff very sharp spines; petioles narrowly winged, spathulate; leaves elliptic-ovate or oblong-ovate, rounded at base, obtusely acuminate, crenulate, 5–7.5 cm. long; racemes 2–7-flowered; petals 8–12 mm. long, 2.4–4 mm. wide; stamens 20–25; ovary globose, not merging into the early deciduous style; fruits small, peel very thin, greenish yellow when ripe.—In places appears to grow without cultivation (Williams).

The Sweet Lime seems not to be distinct taxonomically; here treated under *C. Limon*, for convenience of nomenclature, the name *C. Limonia* Osbeck, Reise Ostind. & China 250. 1765, not disposed

of by Swingle; Annetta Carter, Univ. Calif. Herb., kindly discovered for me that their English edition, 1771, contains no such name; according to Merrill, Amer. Jour. Bot. 3: 579, this name appears only in the German edition, 1765.

Loreto: Lower Itaya, *Williams 177.* Lower Nanay, *Williams 285; 471.* Upper Itaya, *Williams 3268.* Pebas, *Williams 1800.*—Cuzco: Santa Ana, *Cook & Gilbert 1556* (det. Tanaka). East Indian Archipelago. "Lime," "limon agrio" (Williams), "lima."

Citrus Aurantium L. Sp. Pl. 782. 1753; 402.

Branchlets with single often short slender spines or stout ones 3–8 cm. long on vigorous shoots; petioles 2–3 cm. long, rather broadly winged, often 10–18 mm. wide at top; leaves ovate, rounded to cuneate at base, obtusely acuminate; flowers large, very fragrant, 5–12 per cent male; peel thick with a rather rough surface becoming brilliant orange with a reddish tint at maturity; cells 10–12 with sharply acid pulp and many seeds.—Fruit becomes hollow at center. Introduced into the Mediterranean region by the Arabs about the eleventh century and for about five centuries was the only orange known to Europeans. It was the much appreciated orange of medieval Europe, used for flavoring marmalade; the flowers were used for perfume. The closely allied and commonly cultivated sweet orange is *C. sinensis* (L.) Osbeck, probably native to southern China but no longer known in a wild condition; it first became known about A.D. 1500. According to Williams the orange is sometimes cultivated. The related grapefruit is *C. paradisi* Macf., origin probably West Indies.

Junín: Hacienda Schunke, *Killip & Smith 24733.*—Ayacucho: In clearing, *Killip & Smith 22816.*—Loreto: Pebas, *Williams 1774.* From southeastern Asia. "Sour or Seville orange," "naranja ácida," "naranjo."

Citrus Limon (L.) Burm. f. Fl. Ind. 173. 1768. *C. medica* L. var. *Limon* L. Sp. Pl. 782. 1753. *C. Limonum* Risso, Ann. Mus. Hist. Nat. Paris 20: 201. *pl. 2.* 1813.

Small thorny trees, the young leaves and flower buds reddish; petioles narrowly winged or margined, plainly articulated with the leaf-blade, this pale green, long-ovate, acuminate, serrate; flowers white above, purplish below; stamens 20–40; ovary tapering into thick deciduous style; fruit oval with 8–10 segments, yellow when ripe.—Brought to the Mediterranean region by the Arabs about

A.D. 1000 and like the sour orange soon much used in medicine; now known as the source of the recently isolated vitamin P; regarding this and its status as a species cf. Swingle, l.c. 399. The origin of the Lemon is unknown; it may be either acid or "sweet" var. *Limetta* (Risso) Engl., or, as distinct, *C. Limetta* Risso, flowers white, fruit not mammillate, the Sweet Lime; cf. remark under *C. aurantifolia*.

Loreto: Lower Nanay, *Williams 266*. La Victoria, *Williams; 2933*. Origin unknown. "Limon," "limon dulce."

Citrus medica L. Sp. Pl. 782. 1753; 396.

Very much like *C. Limon* but the petioles wingless or merely margined and not obviously articulated with the blades, stamens 30–40 or even 60; style sometimes persisting.—According to Swingle, Citron was the first citrus fruit to reach the Mediterranean, brought by the armies of Alexander the Great apparently about 300 B.C. Theophrastus called it the Persian or Median Apple; Engler, Pflanzenfam. ed. 2. 19a: 338. 1931, wrote: Since the fruits had the same uses as the wood of the Sandarac Tree, the name of this wood, "Citrus," was transferred to the fruit as *Mala citrea*. So the Median Apple became the Citrus Apple and today we have the common term citrus for Citron and all its many relatives. The candied peel is well known as a "dulce."

Ayacucho: Clearing near Aína, *Killip & Smith 22815* (det. Swingle).—San Martín: San Roque, *Williams 7211*.—Loreto: Iquitos, *Williams 1464; Killip & Smith 27420*.—Cuzco: Santa Ana, *Cook & Gilbert 1666* (det. Tanaka). San Miguel, *Cook & Gilbert 1078* (det. Tanaka). From China and British India, southward. "Limon cidra," "cidra."

2. MURRAYA Koenig

Unarmed trees with imparipinnate leaves of alternate leaflets and rather showy 5-merous flowers crowded in axillary or terminal corymbs or panicles. Sepals nearly distinct or united below the middle. Petals imbricate. Stamens 10, free, disk annulate or cushion-like. Ovary ovoid, 2–5-celled with 1 or 2 ovules superimposed or subcollateral in each cell. Style slender, finally deciduous, stigma capitate. Fruit a small berry with mucilaginous pulp.

Murraya paniculata (L.) Jack, Malay Misc. 1: 31. 1820. *Chalcas paniculata* L. Mant. 68. 1767. *M. exotica* L. Mant. 2: 563. 1771.

Branchlets slender, finely crisp-puberulent toward the tips; leaves with 2 or more pairs of obliquely obovate subsessile leaflets about 2–3.5 cm. long, 1–2 cm. wide; flowers white, 13–18 mm. long; stamens alternately shorter; berries ovoid, orange-colored, about 13 mm. long, with 1 or 2 villous seeds.—Often cultivated in warm regions; elsewhere in greenhouses; native to southeastern Asia.

San Martín: Near Tarapoto, *Williams 5946*.—Loreto: Iquitos, *Williams 3696*. Yurimaguas, *Williams 4055*. "Naranjilla." Asia.

3. AMYRIS [P. Br.] L.

Trees or shrubs, usually glabrous, often aromatic, with alternate or opposite compound, sometimes unifoliate, pellucid-punctate leaves and many small whitish bibracteate perfect flowers mostly in 3's in axillary or terminal panicles. Sepals and petals 3 or 4 (5), the former persisting, the latter imbricate in bud, spreading in late anthesis, the stamens twice as many from base of obscure disk; filaments filiform. Carpels in female flowers on a thick disk; ovary with 2 ovules pendulous from apex of the single cell. Fruit a fleshy drupe with 1 seed.—In flower may simulate species of *Zanthoxylum*, that genus however with usually unisexual flowers.

Amyris pinnata HBK. Nov. Gen. & Sp. 7: 37. *pl. 610*. 1824.

Young branchlets and panicles minutely crisp-puberulent; stipules none; petioles opposite, 2.5–3 cm. long; leaves imparipinnate with 2–3 pairs of opposite ovate (or terminal elliptic) leaflets, the lateral sometimes oblique, all obtuse or obtusely subacuminate, rounded at base, obsoletely crenate or undulate, reticulate veined, membranous, glabrous, lustrous above, paler and dull beneath, 3.5–7 cm. long, 2–4 cm. wide, the lower smaller, petiolules about 4 mm. long; panicles axillary, solitary, much branched, peduncles to about 7 cm. long, flowers 1–3, the short pedicels medially and minutely bracteolate; calyx urceolate, typically acutely 4-lobed, glabrous but puncticulate glandular as the 4 (type) petals, these white, elliptic, somewhat narrowed below, rounded at tip; stamens 8, 4 longer, anthers all alike; ovary glabrous but punctate; stigma sessile.—Type, "trop. Amer." *A. balsamifera* L., West Indies, Cuba, Colombia and Ecuador, has a pubescent ovary; its hard wood, known as Torch Wood, is aromatic and popular to burn for the fragrance.

Amazonas: Region of San Carlos, 1,400 meters, *Weberbauer 7146*. Colombia.

4. ZANTHOXYLUM [Catesby] L.

Fagara L. Syst. Nat. ed. 10. 897. 1759.

Shrubs or trees, the branches and leaves often armed with straight or recurved spines, the leaves often imparipinnate, rarely 1–3-foliate with usually opposite petiolulate entire or crenate pellucid-punctate leaflets. Cymes often panicled, crowded, axillary or terminal, the dioecious or polygamous flowers usually white or greenish, the fruits of 1–5 carpels usually aromatic and glandular-punctate. Calyx 3–5-parted, rarely deciduous, petals 3–5, rarely none. Disk short or obscure. Male flowers with 3–5 (–8) stamens alternate to the petals or opposite the sepals (*Fagara*), in the female wanting or staminodal. Carpels oblique, 1-celled, the style sublateral, stigma capitate; ovules 2.—The mature fruit parts are ordinarily bivalvate to the middle and expose the single reddish or black lustrous seed pendulous on slender funicle. The name is spelled variously, the substitution of X for Z alone being noteworthy since alphabetically significant.

In *Fagara*, according to Engler, Pflanzenfam. ed. 2. 19a: 215. 1931, the flower parts are in alternation while in *Zanthoxylum* the 5–8 stamens alternate with the 5–8 petals. This may be significant morphologically—and thus historically—but, as Engler also hints, the division of the otherwise homogeneous group on this basis is scarcely expedient in view of the fact that the diagnostic character is not observable in pistillate plants. However, so far as known all the Peruvian species are actually referable to *Fagara* or, more practically, to section **Fagara** (L.) Macbr., comb. nov.

The species' characters seem to be intangible; Engler, in Mart. Fl. Bras. 12, pt. 2: 156–158. 1874, had to resort in his key to such doubtful distinctions as presence or absence of spines, development of leaf-crenation, etc.; in Pflanzenfam. ed. 2. l.c., he remarks that the number of carpels may prove to be significant and this is my impression: the nature and position of the inflorescence may be further clues to the relationship of the species together with the usual petal number, which however like the leaflet number is variable within the same species and in itself of questionable value. The following key then is merely academic and the validity of the species has, as usual of necessity in my compilations, not been proved. Many species, it may be remarked, are incompletely known, lacking fruit or some other part; surely one cannot intelligently write "armed" or "unarmed" when one has only a flowering branchlet!

Fagara peruviana Willd. ex Roem. & Schult. Mant. 3: 228. 1827 is *Z. affine* HBK. of Mexico according to Index Kewensis, and in spite of the name is therefore omitted here; the supposed origin of the species is apparently an error, as has happened before.

Ruiz and Pavón in their journal gave a name that was never published to a species from Chacahuasi and Pozuzo, Huánuco, which could be several species, perhaps most probably *Z. Culantrilo*, known, according to them, as "culandro" or "culantro" because the odor is similar to that of coriander.

Leaflets sessile or subsessile, often narrow or small, except *Z. mantaro*, about 2.5 cm. wide or narrower.

Pubescence lacking or simple; flowers racemose or pseudoracemose.

Leaflets more or less crenulate, mostly 2 cm. wide or wider; petals 4.

Leaflets 7–11, crenulate, usually to 2.5 cm. long; branches usually thorny; spikes usually only to 15 mm. long. *Z. Fagara.*

Leaflets 5–13, crenate, mostly 3.5 cm. long or longer; spikes usually 2.5 cm. long or longer; spines none or few. *Z. Culantrilo.*

Leaflets subentire, to 4.5 cm. wide; petals 5..... *Z. mantaro.*

Pubescence minutely stellulate; flowers paniculate *Z. Ruizianum.*

Leaflets obviously petiolulate, to 4 cm. wide or wider.

Leaves glabrous.

Inflorescence terminal; petals 3 or 5.

Leaflets crenulate, 3–5 pairs.

Petals 3..... *Z. acreanum.*

Petals 5..... *Z. juniperinum.*

Leaflets entire or nearly, often more than 5 pairs.

Leaflets obtusely short-acuminate; pedicels to 2 mm. long. *Z. Riedelianum.*

Leaflets acutely acuminate; pedicels about 0.5 mm. long. *Z. valens.*

Inflorescence axillary; petals 4 or 5; leaflets entire or nearly.

Panicles nearly racemiform, congested in fruit.... *Z. Sprucei.*

Panicles open, the spreading branches elongate. *Z. Weberbaueri.*

Leaves more or less pilose..... *Z. tumbezanum.*

Zanthoxylum acreanum (Krause) Macbr., comb. nov. *Fagara acreana* Krause, Notizbl. Bot. Gart. Berlin 6: 143. 1914.

Scandent branches and slender branchlets terete or the latter lightly compressed apically, early sparsely puberulent, densely lenticellate and with a few short erect conic acute spines; petioles 5–6 cm. long; leaves alternate, 3 dm. long, with 3–4 pairs of opposite petiolulate thin-coriaceous glabrous oblong leaflets, narrowed to base, obtusely acuminate (acumen 10–12 mm. long), often little unequal, mostly 8–12 cm. long, about 4–4.5 cm. wide, or the terminal a little larger, all lightly crenulate, with 12–14 lateral nerves very prominent beneath; flowers subsessile, in ample dense many-flowered terminal panicles 12–15 cm. long; flowering branchlets puberulent, with small ovate acute bracts; calyx lobes nearly free, scarcely 0.5 mm. long, sparsely pilose below; petals 3, white, oblong, obtuse, three or four times longer than calyx and a little shorter than the 3 filaments; anthers ovoid, subcordate; rudimentary ovary with short style.—Belongs near *F. subserrata* Engl. and *F. Warmingii* Engl. but leaflets long-petiolulate (Krause). But it seems to be essentially *Z. juniperinum* (from which Engler distinguished it on less crenulate leaflets) unless the flowers are constantly 3-merous. F.M. Neg. 26412.

Río Acre: San Francisco, *Ule 9552*, type.

Zanthoxylum Culantrilo HBK. Nov. Gen. & Sp. 6: 2. 1823. *Fagara Culantrillo* (HBK.) Krug & Urban, Bot. Jahrb. 21: 574. 1896.

Much branched, unarmed; younger branchlets hirtellous; leaves ternate or imparipinnate with 2 (or more) pairs of oblong obtuse glabrous crenate (punctate-glandular between the crenations) leaflets, subcuneate at base, obsoletely reticulate, membranous, paler beneath, 24–32 mm. long (3.5–8 cm., fide Urban), 10–14 mm. wide, sessile except the terminal in the ternate leaves, the 2 lower smaller in the pinnate, rachis obscurely margined, petiole not at all; inflorescence axillary or subterminal (lateral and terminal, speciform or branched, Urban), a little longer than the petioles, scarcely 2.5 cm. (or longer), with 2–4 spreading branches; hirtellous flowers subsessile, few; calyx lobes and petals 4, the former rounded the latter 4 times longer, white; male flowers with 4 stamens, anthers elliptic, bifid at base, obtuse, the female with no stamens, ovary sessile, glabrous, 1-celled, stigma capitate; carpel subglobose, smooth, glabrous, the seed globose.—A slender tree, 4–6 meters (Killip & Smith); my collection, a strictly branched tree. If distinct from

Z. Fagara probably includes most if not all of the material referred to that species. The name was originally written with one "l". The var. *paniculata* Engl. is the typical form.

Cajamarca: Jaén de Bracamoros, *Bonpland*, type. Nanchó, *Raimondi*.—San Martín: Region of Moyobamba, *Weberbauer 4498;* 289. Tarapoto, *Spruce 4293* (det. Urban).—Junín: Perené, *Killip & Smith 25032*. San Ramón, *Schunke A102*.—Huánuco: near Pozuzo, *4773*. San Carlos, *Mexia 8212*. Colombia; Venezuela; Jamaica. "Culantrilo," "culantro," "contrevenosa."

Zanthoxylum Fagara (L.) Sarg. Gard. & For. 3: 186. 1890. *Schinus Fagara* L. Sp. Pl. 389. 1753. *Fagara Pterota* L. Syst. Nat. ed. 10. 897. 1759.

Intricately branched shrub or small tree, the branches commonly thorny, the branchlets early puberulent; petioles and leaf-rachises winged, the leaves several to about 10 cm. long with 3–4 pairs of obovate-elliptic (or 7–11 leaflets, Urban) sometimes somewhat orbicular leaflets mostly 1.5–2.5 cm. long, narrowed to petiolulate base, rounded or retuse at apex, lustrous above, crenulate, the glands mostly below the crenations; flowers in short contracted axillary spikes (early capituliform-racemose) 7–15 mm. long, 4-merous, the yellow-green petals 2–3 mm. long, the male flowers with 4 exserted stamens; carpels 2, globose, 3–4 mm. in diameter, the seed black.—Doubtfully in Peru unless *Z. Culantrilo* is not distinct. Illustrated, Sarg. Silva 1: *pl. 32*.

Cajamarca: *Raimondi*.—San Martín: Tarapoto, *Williams 5510; 5511; Ule 6355*. Near Moyobamba, *Klug 3729*.—Junín: La Merced, *Soukup 2489*.—Loreto: Yurimaguas, *Williams 4751; 4449*. Florida to Venezuela and Colombia; and apparently Brazil; Galapagos? Peru? "Shapilleja" (Williams); "una de gato."

Zanthoxylum juniperinum Poepp. & Endl. Nov. Gen. & Sp. 3: 77. 1845; 167. *Fagara juniperina* (Poepp. & Endl.) Engl. Pflanzenfam. 3, 4: 117. 1896.

Glabrous except the younger puberulent panicles; branches long-rugose with stout spines, the terete branchlets purplish; petioles acutely grooved above, 1.5–3 dm. long, internodes 2–7 cm. long; leaves coriaceous, green and lustrous above, glandular and sometimes pellucid punctate at margin, mostly abruptly pinnate with 3–4 pairs of indistinctly crenate gland-margined oblong-obovate obtusely or rather acutely acuminate espinose leaflets, the larger 1.5 dm. long,

7 cm. wide, acumen to 1 cm. long; panicles 1–1.5 dm. long and nearly as broad, glabrous in fruit; pedicels 1–2 mm. long; white petals and stamens 1.5 mm. long; calyx coriaceous, minutely puberulent lobes rounded; carpel solitary, subglobose, brown, 3–4 mm. in diameter, the glands small.—Type from "a tall tree." Similar but with aculeate petioles is *Z. quinduense* Tul., 168, panicles glabrous, and *Z. macrospermum* Tul., 168, panicles velutinous, both species Colombian. F.M. Negs. 12447; 26417.

Loreto: Maynas, *Poeppig 2465*, type. Yurimaguas, *Williams 5205*. Santa Rosa, *Williams 4911*. "Walaja."

Zanthoxylum mantaro Macbr., comb. nov. *Fagara mantaro* Macbr. Candollea 5: 372. 1934.

Similar to *Z. Culantrilo* but except for the lightly pulverulent young branchlets nearly glabrous and the leaflets subentire; branches in type unarmed; leaves dense, 8–15 cm. long, the puberulent teretish petiole complanate above but not at all winged, the 3–5 pairs of leaflets sessile, elliptic, obliquely rounded at base (or slightly and obtusely acuminate), typically rounded at tip, to 6 cm. long, half as wide, especially the lower smaller, all coriaceous, lustrous, epunctate, the midnerve very prominent beneath, lateral nerves nearly parallel, scarcely prominent, the margin subentire or remotely and obscurely dentate; racemes little branched, about 3 cm. long, minutely puberulent as the pedicels; calyx segments ovate; petals 5, elliptic-oblong, sparsely and most minutely ciliate, 2.5 mm. long; stamens little exserted; fruit consisting of 1–3 stoutly stiped or sessile ovate-rotund somewhat compressed sparsely foveolate carpels 4.5–nearly 6 mm. wide.—In spite of the fact that I have not found an earlier name for this shrub-tree there probably is one; my collections at one time referred to Brazilian species having leaflets 10–12 cm. long. The Colombian *Z. amoyense* Tul. has smaller oblong leaflets obliquely acute at base; *Z. macrospermum* Tul. may be near, but its leaflets are minutely but distinctly crenulate-serrulate and the rather similar *Z. quinduense* Tul. has pyramidal panicles. If this proves to be a valid species the name may be "corrected" to *mantaranum*, which probably was intended, the lack of ending unnoticed in proof.

Junín: Río Mantaro, *Weberbauer 6585*, type. Huánuco: Cani near Mito, *3440*. Mito, *1732*. Cuzco: Torontoy, Urubamba Valley, *Cook & Gilbert 1772*.

Zanthoxylum Riedelianum Engl. in Mart. Fl. Bras. 12, pt. 2: 162. 1874. *Fagara Riedelianum* Engl. Pflanzenfam. 3, 4: 117. 1896.

Trunk straight, conically aculeate; younger branchlets densely ashy pilose, older long-rugulose with gray bark; petioles broadly canaliculate above, 1.5–2 dm. long; leaves abruptly, rarely imparipinnate with 4–6 pairs of subentire subequal (except 2 small lowest ones) leaflets the middle and terminal oblong-elliptic, shortly acuminate, obtusish, acute at base into canaliculate petiolule 5–8 mm. long, mostly 9–12 cm. long, 2.5–4 cm. wide; medial and lateral nerves as the reticulate veins prominent beneath; panicles terminal, shortly and densely pilose, compound, the branches spreading, the lower to 1 dm. long; flowers glomerulate on glabrate slender pedicels 2 mm. long; calyx glabrous except for cilia on the 5 ovate acute lobes, the 5 acutish petals 5 times longer; stamens 4 mm. long, twice as long as the petals; female flowers unknown.—The Peruvian specimen distributed as this is aberrant, the inflorescence axillary, the leaflets sessile, variations known to occur in other species; however here the collection is referred to *Z. mantaro*. Illustrated, Engl. l.c. *pl. 35*. F.M. Neg. 19227.

Peru: Probably. Ecuador; Brazil (São Paulo).

Zanthoxylum Ruizianum ([Klotzsch] Engl.) Macbr., comb. nov. *Z. obscurum* Engl. var. *Ruizianum* [Klotzsch] Engl. in Mart. Fl. Bras. 12, pt. 2: 170. 1874. *Z. rhoiifolium* Lam. var. *sessilifolium* Engl. l.c.

Branches and branchlets probably armed, the flowering tips sparsely and minutely lenticellate, drying rugulose, finely puberulent, a few similar trichomes, mostly minute, on leaf-rachises and under side of subtending leaves, these soon glabrous, 1.5–2 dm. long including the short petioles; rachises angulately margined by decurrent-based leaflets, these mostly alternate, 8 or more pairs, oblong-lanceolate, strongly oblique at subsessile base, shortly and broadly acuminate the tip itself truncate or minutely retuse, subequal (unless the lower pair), mostly about 6 cm. long, 15–18 mm. wide, obviously, even strongly crenate with rather prominent indentation-glands, drying brown-green, paler beneath, slightly lustrous above, sparsely pellucid-punctate; panicles about 8 cm. long and broad, the primary widely divaricate branches 3–6 cm. long, secondary about 1 cm. long; pedicels scarcely 1 mm. long; calyx lobes 5, rounded, minutely ciliolate; petals probably less than 1.5 mm. long; ovary subglabrous; carpels (young) solitary, brown, sparsely glandular.—Descriptions from scraps of type and Williams material in bud and young fruit; detached leaves probably belonging are sparsely aculeate,

the spines 8–10 mm. long. Seems to differ from *Z. obscurum* with about 6 pairs of leaflets, their petiolules 4–5 mm. long; *Z. caribaeum* Lam. of this affinity is apparently glabrous; in Pflanzenfam. ed. 2. 19a: 220. 1931, Engler keys out that species and *F. Ruiziana*, which thus becomes questionably published, as completely glabrous; the latter however as to type is as described above and perhaps should be included in *Z. rhoiifolium* Lam. at least as interpreted by Engler but, ex char., it has ovate acute calyx lobes and the type locality is said to have been the East Indies; in view of the uncertainty of the application of the name I retain, albeit reluctantly, the Klotzsch plant as distinct, as apparently Engler in his most recent study considered it; *Z. aculeatissimum* Engl., 176, of Bolivia, may be an available name but apparently it is not, as its leaflets are somewhat broader, more ovate-oblong and longer attenuate to tip. F.M. Neg. 12460 (*Z. obscurum* var.).

Huánuco: Macora, *Ruiz & Pavón* (type, *Z. obscurum* var. *Ruizianum*). Without data, *Ruiz & Pavón*, Herb. Lambert, fide Engler.—San Martín: Tarapoto, *Williams 5559; 6500; 6669.* San Roque, *Williams 7235.*—Loreto: Mouth of Río Santiago, *Tessmann 4126.* "Quillu-casha," "shapilloja," "huillca."

Zanthoxylum Sprucei Engl. in Mart. Fl. Bras. 12, pt. 2: 167. 1874. *Fagara Sprucei* Engl. Pflanzenfam. 3, 4: 117. 1896.

Branches rather stout, with gray smooth bark armed with many spines; petioles 2–3 dm. long, aculeate, grooved above, internodes sometimes 5 cm. long, with a few aculei 2–3 mm. long; leaves in age coriaceous, early sparsely punctate, glabrous, lustrous above, imparipinnate or abruptly pinnate, with 3–5 pairs of essentially entire or lightly crenate subequal ovate-oblong or oblong scarcely acuminate or shortly and falcately obtusish leaflets that are oblique to the 2–3 mm. long petiolules, the larger 12–14 cm. long, 5–6 cm. wide; lateral nerves as veins prominent both sides, the midnerve so beneath where aculeate; flowering branchlets axillary, compound-paniculate, in fruit 4–6 cm. long, branched from base, lower branches 2 (–4) mm. long, the stout branchlets angled, puberulent; calyx lobes short, obtuse; petals 4 (always?), broadly ovate, 1.5 mm. long; carpels 3 or 4, ovate-rounded, strongly compressed, 2.5 mm. long and broad, not at all stiped, brown foveolate-rugulose.—Tree 20 meters high, 6 dm. in diameter (Tessmann). *F. caudata* Huber, Bol. Mus. Goeldi 5: 422. 1909, has petiolules to 1 cm. long, leaflets 6 cm. long, 2.5–3 cm. wide, caudate-acuminate and solitary carpel about 1 cm. long, 6 mm. wide. F.M. Neg. 12461.

San Martín: Tarapoto, *Spruce 4187*, type; *Williams 5681*. Zepelacio, *Klug 3373* (det. Standley).—Loreto: Yurimaguas, *Williams 4006*. Puerto Limón, *Tessmann 3866*. Pumayacu, *Klug 3161* (det. Standley). Río Acre: *Ule 9506* (det. Krause). "Valajol," "ualaja" (Tessmann).

Zanthoxylum tumbezanum Macbr., comb. nov. *Fagara tumbezana* Macbr. Field Mus. Bot. 8: 119. 1930.

Branches glabrous, apparently little or not at all armed, the younger as the leaves both sides more or less densely short-pilose; leaves crowded, very unequal, sometimes sparsely yellowish-aculeate beneath, the 3 or 4 pairs of short-petiolulate leaflets oblong-elliptic or subovate-elliptic, shortly acutish acuminate, obtuse at the oblique base, entire or minutely crenulate, 3–5 cm. long, 1.5–2 cm. wide, mostly 8 cm. long, 3 cm. wide, chartaceous-coriaceous, the nervation, including the reticulate veins, inconspicuous both sides; panicles subracemose, axillary, minutely pilose, 4 cm. long; pedicels slender, 3 mm. long; calyx segments ovate, about 0.5 mm. long; petals 5, narrowly ovate-oblong, glabrous, 2 mm. long, filaments nearly as long, the cordate anthers conspicuous; ovary rudimentary, attenuate into short style.—Perhaps related to *F. Riedeliana* Engler which has been found as near as Ecuador but that as to type glabrous or only lightly pubescent. It resembles, too, Andean material referred to *Z. rigidum* Humb. & Bonpl. ex Willd. Sp. Pl. 4: 756. 1806 of "middle America" which, at least as to type, has emarginate leaflets, aculeate and pubescent beneath only on veins.

Tumbez: Mountains east of Hacienda Chicama, *Weberbauer 7642*, type.

Zanthoxylum valens Macbr. ex L. Williams, Field Mus. Bot. 15: 228. 1936. *Fagara valens* Macbr. Candollea 5: 373. 1934.

Said to be a large tree but the branchlets and petioles unknown; leaves about 3 dm. long and 13-foliolate; leaflets subcoriaceous, very lustrous above, little so beneath, subequal, obliquely oblong-elliptic, strongly oblique or also acute at base, abruptly caudate-acuminate (acumen 7–10 mm. long), mostly 13 cm. long, 5.5 cm. wide, entire, the very prominent midnerve most minutely pulverulent, reticulate veined especially beneath, the lateral nerves prominent both sides, minutely and densely puncticulate; petiolules 7–10 mm. long; flowering branches pulverulent, 3 dm. long, paniculate, with spreading branchlets; pedicels very short; calyx parts short, ovate, acute; petals 5, subovate, glabrous, scarcely 1.5 mm. long, stamens filiform,

nearly twice as long.—Material incomplete but perhaps nearest *Z. cuyabense* Engl. and *Z. Sprucei* Engl.; it could be the staminate plant of the latter but the leaflets are more numerous than recorded for that species. The rachis of *Williams 574* is sparsely aculeate.

Loreto: Pebas, *Williams 1962*, type. In forest south of Nanay, *Williams 574*. "Raia-caspi."

Zanthoxylum Weberbaueri (Krause) Macbr., comb. nov. *Fagara Weberbaueri* Krause, Repert. Sp. Nov. 2: 26. 1906.

A much branched erect shrub, glabrous except the shortly pilose inflorescences; branchlets armed with compressed brown spines about 5 mm. long; petioles mostly unarmed, upper half sulcate, petiolules scarcely so, these about 1 cm. long; leaves imparipinnate, with 3–4 pairs of entire subcoriaceous sparsely pellucid-punctate leaflets drying dark above, paler beneath the midnerve and laterals prominent, elliptic, 11–13 cm. long, 4–5 cm. wide, acute at base, apically contracted into acumen about 1 cm. long; flowers white, in compound racemes (or paniculate); pedicels about 1 mm. long; calyx cupulate, the very short segments broadly ovate; petals 4, 3-nerved, the lateral ones less distinct, ovate, 2–3 mm. long, the stamens about twice as long, filaments a little thickened toward the slightly dilated base, anthers yellow, ellipsoid; stigma sessile, bifid.—To 8 meters high. Klug specimen is nearly glabrous, no spines. Section *Macqueria*, in the vicinity of *Z. spinifex* (Jacq.) of the West Indies and Venezuela (Krause); so distinguished by Engl. Pflanzenfam. ed. 2. 19a: 218. 1931 from *Z. Culantrilo* by the entire leaflets; in these it resembles *Z. mantaro* but its leaflets are petiolulate, its petals apparently 5. F.M. Neg. 26424.

San Martín: East of Moyobamba near the Río Mayo, 800 meters, *Weberbauer 4769;* 287.—Loreto: Cachipuerto, between Balsapuerto and Moyobamba, *Klug 3126*.

5. METRODOREA St. Hil.

Similar to *Esenbeckia* but the petioles broadened at base and with small appendages or lanceolate leaves at or near it, the leaves themselves always opposite. Petals valvate in bud. Ovary entirely immersed. Fruit capsular, protuberances unequal in size.—Commemorates Metrodoro Sabio who, according to Pliny, was the first to accompany plant descriptions with illustrations. Apparently the genus, considered taxonomically, is a part of *Esenbeckia*, but many species have a rather different facies.

Metrodorea flavida Krause, Notizbl. Bot. Gart. Berlin 6: 146. 1914. *Esenbeckia coriacea* A. C. Sm. Bull. Torrey Club 60: 358. 1933.

Branches and branchlets slender, terete, usually densely minutely lenticellate as the stout petioles, these about 2 to nearly 3 cm. long, strongly dilated at base, the apex little enlarged; leaflets usually 3, sessile, thin-coriaceous, glabrous, a little lustrous, drying brown beneath, oblong or obovate-oblong, obtusely acuminate, subacute at base or the lateral slightly oblique, 1–1.5 dm. long, 4.5–6.5 cm. wide, lateral nerves 9–12, prominent beneath; flowers whitish-yellow, many in terminal and axillary lax panicles 1–2 dm. long, to 1 dm. wide; flowering branches mostly opposite, sparsely pilosulous or glabrate, pedicels puberulent, subequaling the globose buds; calyx segments 6, broadly ovate, 1–1.2 mm. long, lightly puberulent and ciliolate, glabrous within; petals oblong, subacute, sparsely pilose, 3–3.5 mm. long, glandular-punctate, about twice as long as the stamens, these with subulate filaments, ovate-cordate anthers; disk thick including the attached ovary, tubercled, the style as long.— The petiole is not only enlarged basally but extended within the axil as a thick free appendage. Differs from the southern Brazilian *M. nigra* St. Hil. in the yellow-white flowers; from *M. pubescens* St. Hil. & Tul. by the longer slenderer petioles and smaller leaves (Krause). Type, 3–18 meters high; 30 meters (Krukoff). Fruit very rugose, 3 mm. long, 4 mm. wide, cells 1-seeded (Smith); the measurements of Smith are very slightly at variance with those of Krause, given above.

Río Acre: Mone Mo, Seringal San Francisco, *Ule 9491*, type. Río Macauhán, *Krukoff 5517* (type, *E. coriacea*). Brazil.

6. ESENBECKIA HBK.

Polembryum Juss. Mém. Mus. Hist. Nat. Paris 12: 519. 1825.

Trees or tall shrubs with crowded, alternate, sometimes opposite, simple to 3 (5)-foliate pellucid-punctate leaves without distinctive stipules or dilated petioles. Branchlets and pedicels of the sparsely or densely flowered inflorescences with a pair of opposite bracts. Sepals, petals and stamens 4 or 5, the first finally deciduous, the second imbricate or nearly valvate in bud, the third between the 8–10 lobes of the annulate or cupulate disk, or this entire. Ovary sessile or immersed, 4–5-lobed and -celled with usually 2 collateral ovules. Fruit sometimes nearly keg-shaped, rarely smooth, breaking into 4 or 5 bivalved 1–2-seeded often radiately disposed carpels.

Endocarp elastic, finally splitting and recurving to eject the exalbuminous seeds.—Named for Nees von Esenbeck, better known in botanical work as Nees.

Leaves simple; petioles not articulate.

Carpels cornute medially; leaves pilose.....*E. cornuta.*

Carpels cristate; leaves glabrous or nearly.....*E. grandiflora.*

Leaves 1–trifoliate; petioles articulate; carpels cornute apically if at all.

Petioles and inflorescence densely pilose.....*E. Warszewiczii.*

Petioles and inflorescence glabrous.

Leaves trifoliate or mostly rounded apically; petals 5 mm. long. *E. venulosa.*

Leaves mostly 1-foliate, obtuse; petals 2.5–3 mm. long. *E. pilocarpoides.*

Esenbeckia cornuta Engl. in Mart. Fl. Bras. 12, pt. 2: 146. 1874.

Branchlets terete, scarcely 3 mm. thick, ashy pubescent, the younger as the new leaves and flowering branchlets (these to 1 dm. long with cymose-paniculate many-flowered inflorescences) densely pilose; leaves above sparsely, beneath closely and very shortly ashy pilose, simple, oblong-elliptic, attenuate to obtuse acumen about 1 cm. long, mostly 10–12 cm. long, 7 cm. wide, the terete petioles 2–2.5 cm. long; midnerve stout, the lateral moderately prominent; flowering branchlets terminal and axillary, pedicels 1–1.5 mm. long, as long as the globose buds, densely ashy pilose as the calyces and petals; sepals acutish, nearly 1 mm. long; petals spreading, 2 mm. long, half as wide at base, glabrous within, stamens nearly as long; disk annulate, 10-plicate, longer than the sericeous ovary; carpels ligneous, subtrigonous, about 17 mm. long, 1 cm. broad, finally glabrate, dorsally horned medially, the horn 5 mm. long and dehiscing to it, ventrally nearly to base.—F.M. Neg. 12512.

Cajamarca: Jaén de Bracamoras, *Warszewicz*, type.

Esenbeckia grandiflora Mart. Nov. Gen. & Sp. 3: 85. 1829; 146. *Polembryum Jussieui* Schott, Rutac. 11. *pl. 6.* 1834, fide Engler.

Branches grayish, the many short densely leafy branchlets brownish-red; petioles 3–6 (–15) mm. long, transversely rugose; leaves simple, sometimes subopposite, more or less obovate-oblong or also ovate, cuneate at base, obtuse or rounded at tip, typically

about 1 dm. long, 4 cm. wide, or often much smaller, coriaceous, glabrous or beneath sparsely pubescent, the middle and lateral nerves there prominent; flowering branchlets from the axils of the longer upper leaves, opposite or alternate, 3–5 cm. long, paniculate or racemose; pedicels 1 cm. long, enlarged below calyx; bracts sericeous, those in panicles 5–10 mm. long, in racemes smaller, the 2 below the globose buds ovate-lanceolate, acute, ciliate; sepals imbricate, sericeous-pilose and ciliate, 1.5 mm. long and broad; petals thick-coriaceous, rufescent, ovate-lanceolate, sericeous without, puberulent within, 4–5 mm. long, 2.5–3.5 mm. wide; disk urceolate, fleshy, 10-plicate, ovary strongly depressed, tuberculate; style exserted 2 mm., stigma capitate; capsules ligneous, 5-celled, the carpels medially dehiscent, longer than 2 cm., less than 1.5 cm. across, with pyramidal tubercles 2–3 mm. long.—The Peruvian specimen was given (in herb.) an untenable species name by Standley and may be distinct from Martius' plant of central Brazil; recent collections from there however seem to be intermediate, so perhaps it is feasible to treat the following as var. **peruviana** Macbr., var. nov. foliis ad 15 cm. longis, 6.5 cm. latis; capsulis ubique tuberculis ad 5 mm. longis dense obtectis.—A 5 meter tree with cream-green flowers (Klug). F.M. Neg. 19225.

San Martín: Zepelacio near Moyobamba, *Klug 3722* (type, var. *peruviana*). Brazil.

Esenbeckia pilocarpoides HBK. Nov. Gen. & Sp. 7: 248. *pl. 655*. 1825; 144.

Typically glabrous except the puberulent-hirtellous inflorescence, and the leaves simple, but variants are pilose or the leaves trifoliate; petioles 1.5–3 cm. long, semiterete, complanate and narrowly winged or margined above; leaflets membranous, pellucid-punctate, lustrous both sides, scarcely paler but more prominently nerved beneath, ovate-oblong or elliptic-oblong, rather obtusely acuminate (acumen 5–10 mm. long, rounded or acute), and articulate, with petiole 1–1.5 dm. long, 4–5.5 cm. wide; flowering branches terminal and axillary, as long as the leaves, the short branches and pedicels puberulent; calyces and petals red-glandular, the ovate-rotund sepals ciliate, strongly imbricate, 1.5 mm. long, 2 mm. wide; petals white-green, elliptic-subrotund, 2.5–3 mm. long and broad; disk deeply 5-plicate; stamens 1.5 mm. long; style very short, clavate-capitate; ovary depressed, fleshy-tuberculate.—After Engler as other descriptions. He included *E. maurioides* Mart. Nov. Gen. & Sp. 3: 82. *pl. 232*.

1829 as var. *maurioides* Mart. ex Engl., l.c. from central Brazil, with upper leaves trifoliate, the leaflets smaller; similar and equally with small flowers is *E. alata* (Karst. & Triana) Triana & Planch., 145, leaflets more often trifoliate, thus approaching to *E. venulosa;* the var. *guianensis* Engl. has unifoliate leaves densely white pilose beneath as also the flowering branchlets, pedicels and calyces. The following (flowers gray-green and dark violet [Klug]) specimens are scarcely adequate for certain determination but apparently belong here; the type was from Venezuela. F.M. Neg. 36820.

San Martín: Zepelacio, 4 meter shrub, *Klug 275; 3380.* To Trinidad.

Esenbeckia venulosa Macbr. Candollea 5: 376. 1934.

Glabrous with terete branchlets and mostly trifoliate subequal numerous leaves on subangulate petioles 3–5 cm. long, somewhat complanate above; leaflets unequal, oblong-elliptic or sometimes elliptic-obovate, rounded-obtuse or retuse, the lateral obliquely cuneate to the scarcely petiolulate base, to 7 cm. long, 3 cm. wide, the larger intermediate distinctly petioled and cuneate at base, to 1 dm. long, half as wide, all chartaceous-coriaceous, but pellucid-punctate, opaque, conspicuously reticulate, especially beneath; panicles subracemose, obscurely and sparsely puberulent, 1.5–3 cm. long; pedicels very short, calyx segments rounded, minutely ciliate, nearly 1 mm. long; petals narrowly ovate-oblong, 5 mm. long, obscurely pulverulent within, glabrous but punctate without; stamens about 1.5 mm. long; anthers large; disk fleshy, 4-plicate, including the ovary, and crowned by the capitellate style.—Relationship not determined but it may well prove to be a glabrous state of *E. Warszewiczii*, the flowers of which were not known.

Junín: Río Mantaro, 2,500 meters, *Weberbauer 6584*, type.

Esenbeckia Warszewiczii Engl. in Mart. Fl. Bras. 12, pt. 2: 148. 1874.

Branchlets terete, 4–5 mm. thick, shortly white sericeous-pilose, densely leafy; leaves subcoriaceous, subglabrous above, sparsely pilose beneath except the white sericeous midnerve, green, very densely glandular-punctate, 3-foliate; petioles terete, 4–5 cm. long, half as long as the intermediate leaflet, this nearly 1 dm. long, 4–4.5 cm. wide, little larger than the oblique lateral (7–8 cm.), oblong-elliptic, obtusish; panicles racemiform, 3–10 cm. long, rachis and short branchlets densely pilose, pedicels obsolete; sepals broadly

ovate, subobtuse, pilose below, glabrate above or faintly ciliolate, about 1 mm. long; petals suboblong, ashy pulverulent within, sparsely and minutely setulose medially without, 5 mm. long; stamens about 2 mm. long; disk fleshy, style capitellate; carpels rugose, truncate above with a dorsal apical horn, dehiscing only above and ventrally, obtuse at base, 1 cm. long and broad.—Seems to be allied to *E. pumila* Pohl of Brazil (Engler); but cf. *E. cornuta* from the same locality, i.e., northern Peru. *E. Dielsiana* G. M. Schulze, Bibl. Bot. 116: 100. 1937, of central Ecuador is less pilose, panicles merely puberulent, pedicels about 1.5 mm. long, petals dark red, ovate, acute, 5–6 mm. long, carpels ecornute about 18 mm. high. A 3 meter shrub, the very hard wood used for canes (Weberbauer). Flowers described from *Weberbauer 7645*. F.M. Neg. 12519.

Cajamarca: San Felipe, 2,000 meters, *Weberbauer 7110*. Sonda, *Warszewicz*, type.—Tumbez: Mountains east of Hacienda Chicama, *Weberbauer 7645*. "Angohuara" or "ongahuara" (Weberbauer).

7. **PILOCARPUS** Vahl

Small trees or shrubs with opposite, alternate or whorled 1–3-foliate or imparipinnate coriaceous or membranous pellucid-punctate leaves, crowded at the tips of the branchlets. Flowers small, in elongate axillary or terminal spikes or racemes, the pedicels, when present, bracteate as the calyx at base, this with 4–5 teeth or subentire, the 4–5 petals coriaceous, minute. Stamens free, 4 or 5, below the annulate disk, with glabrous subulate filaments and versatile ovate anthers. Ovary depressed-globose, deeply 4–5-lobed; style short, stigma capitate, 4–5-lobed. Carpels 1–5, nearly separate, lunate, loculicidally bivalved, 1-seeded, more or less ribbed.

Pilocarpus spicatus St. Hil. ex DC. Prodr. 1: 728. 1824: 133.

Glabrous except the spiciform racemes these early pilose-puberulent, becoming glabrate, 3 dm. or so long; branching dichotomous, the branchlets 3–4 mm. thick; petioles alternate, typically 1–2 cm. long, lightly canaliculate; leaves simple, membranous, pale green, reddish glandular pellucid, oblong-elliptic, typically obtuse, acute at base, revolute, midnerve beneath and lateral nerves as reticulate veins prominent both sides; pedicels 2–4 mm. long; calyx lobes obtuse, ciliolate; petals greenish, 2 mm. long; carpels mostly 5, compressed, dorsally and ventrally carinate, reddish glandular, 7 mm. long and broad.—*Williams 4878* in fruit seems to be the same as *Ule 9500* in flower and if so they probably represent a distinct

species; at present they may be designated var. **peruvianus** Macbr., var. nov. petiolis circa 5 mm. longis, foliis breviter acuminatis, carpellis (Williams spec.) circa 10 mm. longis et latis. A 2–8 meter shrub with yellowish-green flowers (Ule). Illustrated, Nees & Mart. Nov. Act. Acad. Leop.-Carol. 11. *pl. 30.*

Loreto: Santa Rosa, *Williams 4878* (apparently, in fruit).—Río Acre: Seringal San Francisco, *Ule 9500* (det. Krause, *P. spicatus;* type, var. *peruvianus*). Brazil. "Sapote yaru" (Williams).

8. **ADISCANTHUS** Ducke

A shrub or small tree with short-petioled obovate-lanceolate leaves narrowed cuneately at base and long-peduncled 2–3 times dichotomous few-flowered inflorescences of brownish-red or white flowers, the calyx 5-toothed, the petals 5, nearly free, the 5 stamens completely so with linear-lanceolate anthers about as long as the filaments. Disk lacking. Style 1, stigma obscure. Carpels 1–5, united to a little above the middle, keeled both sides, 1-seeded, transversely rugulose; endocarp falling with seed.—Apparently not generically distinct from *Euxylophora* Huber, Bol. Mus. Goeldi 10: 84. 1910, with obovate leaves, inflorescence 3–4 times dichotomous, linear anthers longer than filaments; *E. paraensis* Huber, fide Ducke, Archiv. Jard. Bot. Rio Jan. 3: 183, attains 40 meters and yields good timber known as "Pao Amarello."

Adiscanthus fusciflorus Ducke, Archiv. Jard. Bot. Rio Jan. 3: 187. 1922.

Completely glabrous except petals within, the unifoliate leaves crowded toward tip of the rather stout striate branchlets, articulate with the stem, subsessile or the petiolar base to 4 cm. long; blades obovate-lanceolate, abruptly acuminate, the larger 3.5–5 dm. long, 8–10 cm. wide, alternate, with smaller 2–3 dm. long, 5–7 cm. wide, firm-membranous, paler and with prominent midrib beneath the slender nearly horizontal parallel secondary nerves prominent both sides, as the fine reticulate veins; floral branches 3–3.5 dm. long, often branched, the flowers few in short cincinni; pedicels strongly rugose, to about 7 mm. long, elongate in fruit, to 1.5 cm. long; calyx 2 mm. long, 4 mm. wide; petals about 1.5 cm. long and densely bearded within to above the middle with rusty trichomes; carpels about 1 cm. long, reddish brown, the endocarp yellow.—Flowers brown-red (Ducke); white (Klug). Illustrated, Ducke, l.c. 4: *pl. 8* (flowers and fruit). F.M. Neg. 12347.

Loreto: Mishuyacu near Iquitos, *Klug 723*. Brazil.

9. LEPTOTHYRSA Hook f.

A weak or straggling simple-trunked little tree with whitish bark, the large obovate-lanceolate nearly sessile epunctate leaves alternate and crowded at the tip. Flowers large, white, subracemose on elongate slender axillary peduncles. Calyx cupulate, obscurely 4-toothed. Petals medially connate, lanceolate, spreading, valvate above. Stamens 4 at base of the entire disk, the filaments filiform, glabrous, free, exceeded by the nearly linear anthers. Ovary depressed, 4-celled, with 1 short connate style, 4-lobed stigma. Carpels 1 or 2, bivalved, 1-seeded, coriaceous, transversely rugose.

Leptothyrsa Sprucei Hook. f. in Benth. & Hook. f. Gen. Pl. 1: 284. 1862; 131.

Glabrous; leaves subcoriaceous, drying paler and brown punctate beneath with many conspicuous parallel secondary nerves that are mostly about 1 cm. apart and join at or very near the margins, 3–7 dm. long, only about 5 mm. wide at the cuneately narrowed base but broadened to 5–13 cm. below the abruptly acuminate apex, the acumen itself 1–2 cm. long, 3–4 mm. wide; racemes 3–4 dm. long, floriferous above the middle with 3–5-flowered 2–5 mm. long branchlets; pedicels 3–4 mm. long; calyx 1.5 mm. long; carpels rhomboid-conchiform, pale brown, 1 cm. in diameter.—One to 2 meters high, aspect of *Erythrochiton brasiliense*, the white flowers to 18 mm. long; illustration in Fl. Bras. evidently from young flowers (Ducke). Illustrated, Mart. Fl. Bras. 12, pt. 2: *pl. 28*. F.M. Neg. 12473.

Loreto: Near Iquitos, *Killip & Smith 29844; Klug 147; (Ducke)*. Upper Mouth of Río Santiago, *Tessmann 3526*. Amazonian Brazil.

10. TICOREA Aublet

Shrubs, the younger branches somewhat sericeous with golden yellow trichomes, the leaves long-petioled with lance-elliptic long-acuminate leaflets, the flowers large, yellowish green or white and many borne at the tips of the branchlets in narrow elongate panicles, the pedicels bracteate. Calyx short with 5 teeth. Corolla with long tube, the 5 lobes valvate, similar in size. Disk urceolate. Stamens 5, united nearly completely with the corolla tube, all fertile, the anther connective with short bilobed appendage at base. Ovary 5-lobed, 5-celled with 2 superposed ovules in each cell; style filiform with thicker obscurely lobed stigma. Carpels connate at base, laterally compressed, the endocarp bivalved.—Nearly *Galipea* unless the lack of sterile stamens is distinctive.

Ticorea longiflora DC. Mém. Mus. Hist. Nat. Paris 9: 146. *pl. 9.* 1822; 92.

Slender branchlets and very membranous leaves soon glabrous except the midnerve and the pilose or ciliate margins, the evanescent pubescence yellow or golden sericeous; glands numerous, mostly small; petioles about 1 cm. long, a little pilose, lateral petiolules 3–4 mm. long with leaflets oblong-lanceolate, oblique at base, the intermediate petiolule 1.5 cm. long with elliptic leaflet 1.5 to nearly 2 cm. long, much attenuate both ends, the nervation prominent both sides, reticulate; flowering branchlets pubescent, about as long as leaves, pedicels as long as calyces, these cupulate, pilose, with acute lobes 1 mm. long; corolla appressed yellow sericeous, tube narrowly infundibuliform 4–5 cm. long, 2 mm. thick, lobes 7–10 mm. long, 2 mm. wide; anthers exserted from throat, appendage 2 mm. long, bilobed; ovary glabrous, disk membranous.—Perhaps is *T. foetida* Aublet? Shrub or small tree to 3 meters, often in argillaceous terrain, the foliage with unpleasant odor but the white flowers perfumed (Ducke).

Loreto: Puerto Meléndez, *Tessmann 4806*. To the Guianas. "Agapurana," "acapu-rana," "cua-acapoc."

11. ERYTHROCHITON Nees & Mart.

Single stemmed or nearly unbranched shrub or small tree with the long spathulate simple or foliate leaves and showy red and white racemose flowers crowded at the summit of the slender trunk. Flowers hypophyllous or peduncled, the peduncles leafy or usually elongate and angled. Calyx large, tubular, typically scarlet, angled, subbilabiate with 3–5 cleft lobes exceeded by the subequal spreading white or roseate corolla lobes. Disk urceolate or annulate. Stamens 5, all perfect or 1–3 anantherous, the filaments affixed to tube. Ovary 5-celled with exserted 5-lobed stigma. Capsule with 5 2-valved scarcely cohering carpels, each with 2 seeds.—Name derived from Greek for red tunic, the usually colored calyx enclosing the corolla tube.

Leaves simple.

Leaves 4–5 dm. long or longer.....*E. brasiliense.*

Leaves at most 2.5 dm. long.....*E. macropodum.*

Leaves trifoliate.....*E. trifoliatum.*

Erythrochiton brasiliense Nees & Mart. Nov. Act. Acad. Leop.-Carol. 11: 170. *pl. 25.* 1823; 107.

Simple stemmed shrub or tree 0.5–5 meters high, with dark bark and 1-foliate horizontally spreading membranous pale green lustrous obovate-lanceolate acutely acuminate leaves that are very long cuneate-attenuate to the short petiolar base, 4–5 dm. long or longer (acumen 1.5–2 cm. long), a dm. or so wide at the broadest part, the lateral nerves prominently reticulate both sides; flower branches equaling the leaves, trigonous, ebracted below but with lanceolate acute pubescent bracts at the base of the glabrous pedicels, these 1–1.5 cm. long, the short floriferous branchlets of 3–8 flowers scar-roughened in age; calyx scarlet, 2.5 cm. long, 1 cm. in diameter, the ovate acute divisions 4 mm. wide enclosing the 5-celled capsule; corolla snow white, tube 3 cm. long, 2.5–3 mm. in diameter, subequaling the calyx segments, viscid; ovary scarcely 2 mm. long, style glabrous; carpels barely coherent, lustrous, crustaceous, 1.5 cm. long.—A handsome plant sometimes cultivated for ornament. Has a remarkable distribution: tropical middle Brazil, subandean eastern Peru, and, rarely, north of the lower Amazon (Ducke); *Pilocarpus* may be a similar example. Illustrated, Mart. Fl. Bras. 12, pt. 2: *pl. 22.*

Huánuco: Wet rocky open place, Pozuzo, *4606.*—San Martín: Near Moyobamba, *Klug 3668.* Tarapoto, *Spruce 3917, Ule 6611; Williams 3761.*—Junín: Colonia Perené, *Killip & Smith 25153.* Brazil.

Erythrochiton macropodum Krause, Notizbl. Bot. Gart. Berlin 6: 146. 1914.

Younger terete branchlets, petioles and leaves minutely pilose, soon glabrous; petioles slender, a little applanate above, subgeniculately enlarged at apex, 3–6 cm. long; leaves simple, membranous, nitidulous, narrowly oblong or oblanceolate-oblong, acutely acuminate (acumen 12–18 mm. long), sometimes slightly oblique toward the cuneately narrowed base, 1.5 to nearly 2.5 dm. long, 6–7.5 cm. wide, lateral nerves 12–14, prominent beneath; flowers few, shortly pediceled in a terminal pseudo-raceme; peduncles nearly 1 dm. long, pilosulous, pedicels slender, pilose, 6–10 mm. long, the basal bractlets pubescent; calyx divisions white, unequal, acuminate, glabrous, 1.5–2.2 cm. long, 5–7 mm. wide, glandular punctate; corolla white or drying yellowish, with curved cylindrical tube, about 3.5 cm. long, densely appressed sericeous-pilose lobes oblong, obtuse; disk truncate; style slender.—Erect shrub to 1 meter high. Nearest *E. trifoliatum* Pilger but leaves entirely simple; distinguished from

E. brasiliense Nees & Mart. by the smaller longer petioled leaves, from *E. hypophyllanthus* Planch. & Lind. by the inflorescence (Krause). F.M. Neg. 12476.

Río Acre: In woods at Porto Carlos, *Ule 9498*, type.

Erythrochiton trifoliatum Pilger, Verh. Bot. Ver. Brandenb. 47: 153. 1905.

Shrub 1–2 meters high; petioles 7–15 cm. long, with 3 elliptic usually somewhat unequal leaflets, shortly narrowed or subrotund at base, shortly and obtusely subcaudate, thin-coriaceous, 1–2 dm. long, 3–7 cm. wide, lateral nerves nearly straight, anastomosing toward margin and prominently reticulate with the veins both sides; flowers at tip of the stout ebracteate puberulent 10–14 cm. long peduncles in dense terminal panicles 5–6 cm. long, the short pedicels as the white calyx minutely villous, slightly exceeding the flowers in bud, the calyx segments free, membranous, broadly lanceolate, about 2 cm. long; petals at first scarcely exserted, finally nearly 3 cm. long, villous, connate to the middle or so, lobes obtuse; stamens 5, 2 or 3 fertile, filaments connate to tube nearly to apex; disk annulate, upper margin irregularly sinuate; ovules 2, style 8 mm. long, stigma rotund; carpels 5, subalate dorsally, the calyx divisions nearly as long.—Remarkable in the distinct calyx lobes; differs from *E. Lindenii* also by the trifoliate leaves (Pilger). The Klug specimen from a 4 meter tree, the fully developed flowers to 3 cm. long, the carpels with dorsal wings 5 mm. high, 6 mm. wide at base. F.M. Neg. 12479.

San Martín: Pongo de Cainarachi, *Klug 2729*.—Ayacucho: Río Apurímac, near Kimpitiriki, *Killip & Smith 23408*.—Loreto: Woods at Cumbaso, 700 meters, *Ule 6715*, type; also *6863*.

12. GALIPEA Aublet

Trees or shrubs with bright green thin simple or trifoliate leaves on terete or winged petioles mostly crowded at the tips of the glabrous branchlets. Flowers perfect, rather large, in axillary and terminal cymose or panicled racemes. Calyx small with 5 erect acute segments alternate to the united petals, these free only at the middle or above. Stamens 5–8, adnate to the corolla tube, the 3–6 sterile sometimes gland tipped, the anther connective basally appendaged. Disk cupulate, enclosing the 4–5-lobed ovary; style long with 3–5-lobed stigma; ovules 2 in each cell, superposed. Carpels united at base and tip, keeled, 1-seeded.—Named for the Galibis,

a people of French Guiana. Some species of the related genus *Raputia* Aublet may yet be found within Peru; the known species have flowers sericeous without, tomentose within, filaments attached below the narrow medially connate petals, carpels laterally joined each with 2 seeds. The red-flowered *Naudinia amabilis* Planch. & Lind. of Colombia would also be sought here but is essentially a *Cusparia* except for its long corolla tube.

Calyx lobes 6–8 mm. long; flowers about 4 cm. long; petioles elongate. *G. longiflora.*

Calyx lobes almost minute; flowers about 2 cm. long; petioles 2 cm. long..... *G. trifoliata.*

Galipea longiflora Krause, Notizbl. Bot. Gart. Berlin 6: 144. 1914.

Branches and branchlets terete, the younger as the petioles densely pubescent becoming glabrate and striate; petioles slightly complanate above, enlarged at base, 12–16 cm. long; leaflets 3, sessile, early pilose beneath on the there prominent 12–14 lateral nerves, glabrous and lustrous in age, ovate-oblanceolate or -lanceolate, narrowed to base, acutely and mostly a little obliquely acuminate (acumen 3–4 cm. long), entire, the middle one 2.5–3 dm. long, 8–11 cm. wide, lateral somewhat smaller; flowers shortly pedicelled or subsessile in long axillary many-flowered panicles, rachis strongly complanate, angulate, long-sulcate to tip, glabrate, 2.4 dm. long; calyx angled, narrowly lanceolate lobes 6–8 mm. long; corolla white, slender tube 3.5–4.2 cm. long, subsericeous-pilose, glabrous within, oblong subacute lobes 3–4 times shorter; upper 2 anthers linear-oblong, lower 3 linear with apical globose glands; disk annulate; style barely exserted.—Sometimes arborescent, 5–15 meters high, the white flowers extra large (Krause). *G. bracteata* (Nees & Mart.) Engl., 99, of eastern Brazil, has deeply lobed calyx but lobes only 2.5–3 mm. long; Amazonian species to be expected include *G. trifoliata* Aublet, 96, and *G. grandifolia* Engl., 98, both with very short calyx teeth; the simple leaves of the latter attain 2.5 dm., the leaflets of the former scarcely 1 dm.

Río Acre: *Ule 9497*, type.

Galipea trifoliata Aublet, Pl. Guian. 2: 662. *pl. 269.* 1775; 96.

Branches terete, slender, the strict densely leafy branchlets purpurescent; petioles 2 cm. long; leaflets unequal, the intermediate one largest, 7–9.(12) cm. long, 2–3 (4) cm. wide, cuneate or arcuately

attenuate to base, the lateral more or less oblique, all oblong-elliptic with short obtuse and deeply emarginate acumen, membranous, early finely pilose becoming glabrous, nitidulous, the medial petiolule canaliculate and margined; panicles 4–5 cm. long, the 1–2 cm. long branchlets mostly 3-flowered, the pedicels 3–4 cm. long; calyx 1.5–2 mm. long, cupulate, sparsely pilose with short obtusish teeth; corolla ashy pubescent, the tube 1.5 cm. long, 1 mm. in diameter, the lobes 5 mm. long, 1.5 mm. wide at base; carpels 5, oblong, obtuse, transversely sulcate, obtusely carinate dorsally, 1 cm. long, 7 mm. wide.—The Ule collection from a tree 5–15 meters tall with white flowers.

Río Acre: In woods near Porto Carlos, *Ule 9499* (det. Krause). Amazonian Brazil and Bahia to Guiana.

13. **RAUIA** Nees & Mart.

Resembles *Galipea* but the rather small flowers with linear pubescent petals connate only at base, nearly valvate. Stamens 4 or 5 and only lightly affixed to petals, the connective without appendage. Known species with simple leaves.—Probably belongs, as Bentham and Hooker thought, to *Galipea;* the name is for A. Rau, a contemporary professor of natural history.

Rauia resinosa Nees & Mart. Nov. Act. Acad. Leop.-Carol. 11: 169. 1823; 94.

Glabrous except the floriferous branchlets, the older branches slender, terete, the younger foliose ones angled as those of the white puberulent corymbs; petioles 1–3 cm. long, glandular; leaves lustrous green or later metallic, membranous, pellucid punctate, oblong-elliptic, long attenuate-acuminate (acumen 1–1.5 cm. long, 3–4 mm. wide), mostly 6–8 cm. long, 1.5–2 cm. wide, the pale midnerve and laterals prominent with the reticulate venation especially beneath; buds angled, incurved at tip; calyx black glandular, 5-angled, 3 mm. high; petals 10–13 mm. long, scarcely 1 mm. wide, spreading or contorted, without minutely, within long white-pilose and biseriately glandular; carpels finally separating, 8 mm. long, 6 mm. across, ventrally and laterally carinate, transversely deeply sulcate and resinous punctate; seeds obovoid, tuberculate.—The small long-campanulate flowers are in open inflorescences, their primary branches 3–4 cm. long the ultimate 3–5-flowered; leaves thin; a low (1–2 dm.) forest shrub with half decumbent stems (Tessmann). Illustrated, Mart. Fl. Bras. 12, pt. 2: *pl. 16.*

Loreto: Mouth of the Río Santiago, *Tessmann 3989.* Brazil.

Rauia Ulei Krause, Notizbl. Bot. Gart. Berlin 6: 145. 1914.

Younger branchlets, petioles and leaves beneath puberulent, finally glabrous; petioles 3–4.5 cm. long; leaves thin-herbaceous (or coriaceous?), nitidulous, oblanceolate-oblong, slenderly acuminate (acumen 12–16 mm. long), long cuneate-narrowed to base, 1.5–2 dm. long or longer, 6 cm. wide or wider, lateral nerves 13–15, slender, prominent beneath; flowers in terminal erect pseudo-panicle, rachis little complanate, puberulent, 12–18 cm. long; calyx campanulate, sparsely pilose, 2.5–3 mm. long, divided to the middle or lower into 5 broadly ovate obtuse lobes; linear-lanceolate acute densely pubescent lobes of the corolla 12–15 mm. long, connate below into a short cylindric tube; upper 2 stamens fertile, shorter, lower 3 sterile, longer, their pubescent filaments a little shorter than corolla, filaments fertile, stamens subulate; disk shortly denticulate; ovary about 2.5 mm. long, with short subcapitate style.—Shrub or arborescent 2–12 meters high. Differs from *R. resinosa* Mart. & Nees by the longer petioled larger leaves, different inflorescence (Krause). The leaves dry coriaceous, black above, brown beneath, the flowers in narrow panicles.

Río Acre: Monté Mo, *Ule 9495*, type.

14. CUSPARIA Humb.

Usually simple stemmed shrubs or trees with fleshy or leathery often long-petioled leaves crowded near the tips of the stems, the leaves simple (leaflets reduced to 1) or composed of 2–7 leaflets, these rather large and elongate, sometimes oval, with heavy midrib and ordinarily acute or acuminate. Flowers except rarely moderately large, pedicellate, commonly crowded, infrequently racemose, axillary or apparently extra-axillary, more or less irregular and with small sometimes bilabiate calyx. Petals linear to long-spathulate, shortly united toward base; stamens 5 (now and then 4–8), attached medially to the petals, all fertile or only 2 or 3 with anthers, these linear and with flattened more or less barbate filaments. Disk about cupulate, 5-dentate and more or less including the ovary. Fruit parts 1–3 and free from each other from the first, each part 1-seeded.—Could be united as by Bentham and Hooker with *Galipea*, in which they also included *Rauia*, which would be more practical and probably more natural taxonomy. The publication of the name, derived from the native "Cuspare," dates from 1822 when validated by De Candolle, Mém. Mus. Hist. Nat. Paris.

Among fruiting specimens not determined but possibly belonging here mention may be made of *Williams 3727* (*Killip & Smith 27150*) from Iquitos, fruits rather tardily separate so maybe a *Pilocarpus* but leaves 5-foliate.

Leaves 5–7-foliate.....*C. toxicaria.*
Leaves simple.
Leaves obtuse or barely acute.....*C. ucayalina.*
Leaves sharply acuminate.....*C. acuminata.*

Cusparia acuminata Pilger, Verh. Bot. Ver. Brandenb. 47: 154. 1905.

A shrub of 3–9 meters, glabrous except the spiciform inflorescence, the membranous elliptic or somewhat obovate leaves long-cuneate to base, obtusely long-acuminate, 2–3 dm. long, 7–11.5 cm. wide, the nerves and reticulate veins prominent beneath; petioles 12–55 mm. long; rachis stout, puberulent-pilose, 6 cm. long; flowers white, the cupulate dentate-incised calyces shortly tomentulose-pilose; petals 5, lightly coherent below, obtuse, villous-tomentose both sides, 7 mm. long; stamens 5, two fertile with filaments villous above, 2.5 mm. long, anthers to 2 mm. long, connective extended 0.75 mm. obtusely; staminodia 3; disk annulate, truncate, scarcely more than 1 mm. high; ovary 5-celled, sparsely pilose apically, style short, stigma little enlarged.—F.M. Neg. 12499.

Loreto: Mouth of Río Santiago, *Tessmann 4077*. Brazil.

Cusparia toxicaria [Spruce] Engl. in Mart. Fl. Bras. 12, pt. 2: 114. *pl. 24*. 1874.

Branches a dm. or so in diameter, the younger densely red-tomentose; petioles longitudinally sulcate, 3–4.5 dm., 3–5 mm. thick below but apically much enlarged, early red-pilose as the stout peduncles, pedicels and calyces; leaves membranous, green, lustrous, with 5–7 often more or less unequal broadly lanceolate long- and acutely-acuminate leaflets, the medial finally 3–4 dm. long, 10–13 cm. wide, with acumen 2–3 cm. long, petiolule 2–2.5 cm. long; midnerve and reticulate venation with lateral nerves prominent; flowers white, essentially racemose, solitary or in 2's or 3's, the rachis 1–3 dm. long; pedicels 1–2 mm. long; calyx cupulate, the ovate-lanceolate lobes equaling the tube, 2 mm. long, persisting and spreading in fruit; petals 5, 1.5 cm. long, 2.5 mm. wide; filaments 1 cm. long, pilose and within, below the anthers, barbate; ovary glabrate, the elongate style glabrous; carpels black, lustrous, carinate

ventrally, about 13 mm. long.—I am not certain that the Río Acre collection is correctly identified. F.M. Neg. 19222.

Río Acre: Xapury, *Ule 9496* (det. Krause). Brazil.

Cusparia ucayalina Huber, Bol. Mus. Goeldi 4: 573. 1906.

Type a low shrub with few if any branches; petioles 3 cm. long, canaliculate above, enlarged at base and apex, ferruginous tomentulose as the ultimate branchlets of the narrow panicles; leaves oblong, cuneate at base, rounded-obtuse or acutish, 2–2.5 dm. long, 7–9 cm. wide, glabrous, except nerves beneath minutely strigillose, subcoriaceous, drying more or less brownish; peduncles about 5 cm. long, pseudoterminal; flowers in a narrow but obvious panicle, the branchlets about 1 cm. long; pedicels 3 mm. long; calyx 5-parted medially or more deeply, the rotund-ovate obtuse or apiculate lobes gray-puberulent without; petals white, connate only at base, spathulate, acutish, 6 mm. long, marginally toward the base whitish tomentulose like the 3 thick ligulate sterile stamens, the filaments of the 2 fertile conglutinate ones puberulent; ovary glabrous, exceeded by the disk, the style two or three times longer, stigma oblong-clavate, 5-sulcate.—Similar in inflorescence to *C. paniculata* Engl., 120, but resembles *C. macrophylla*, 115, *C. cuneifolia*, 116, *C. Gaudichaudiana*, 116, etc., more in ovary and style (Huber). There is an unnumbered negative of the type at Chicago Museum, accompanied by a scrap. Illustrated, Huber, l.c. 574 (flowers).

Loreto: Pampa del Sacramento between Sarayacu and Santa Catalina (*Huber 1513*, type).

15. MONNIERIA L.

Finely subappressed hispidulous and somewhat glandular hirsute branching annual (or sometimes suffrutescent) with soft petioled 3-foliate leaves, the leaflets lance-elliptic, and small bilabiate flowers in bifurcate somewhat scorpioid cymes. Sepals 5, very unequal, the outermost foliate and bract-like, the next one about half as long, the inner minute or obsolete. Stamens 5, attached to corolla tube, the 2 fertile with bearded filaments, the sterile bearded medially. Disk overtopping ovary, the 5 carpels free except at the short style.—Genus suggests in aspect especially in herbaria some Euphorbiaceae.

Monnieria trifolia L. Sp. Pl. ed. 10. 1153. 1759.

Low and herbaceous, again definitely woody except the uppermost branchlets and then as much as 1 meter high; petioles to about

3 cm. long; leaflets elliptic to oblong-elliptic, shortly acute both ends or obtusish at the shortly narrowed tip, or, especially the middle one, attenuate to the more or less elongate petiolule, to about 5.5 cm. long, 2 cm. wide, pale green, soft membranous; flowers white, the forked inflorescence with long peduncle to about 4.5 cm. long, the dense flowering branches 1–2 cm. long appearing closely bracted by the foliate outer sepals, these 5 mm. long or longer; carpels about 2 mm. long.—The sharp aromatic roots have been used in medicine. Illustrated, Pflanzenfam. ed. 2. 19a: 292. 1931.

San Martín: Chazuta, *Klug 4024*.—Loreto: La Victoria, *Williams 2612*. Caballo-Cocha, *Williams 2030; 2096; 2135*. Widely distributed, Brazil to Mexico.

16. RAVENIA Vell.

Peruvian species a foetid tree with large simple leaves and terminal erect few-flowered inflorescences of glandular green somewhat bilabiate funnelform flowers. Calyx lobes very unequal, strongly imbricate. Petals medially connate. Fertile stamens 2 adnate to the tube below the upper lip. Disk cupulate. Carpels 5.

Ravenia biramosa Ducke, Archiv. Inst. Biol. Veg. Rio Jan. 2: 48. 1935.

Small foetid tree, glabrous except the sparsely and minutely pubescent inflorescence, the flowering portion of this typically biparted, the racemiform branches finally to 12 cm. long, alternately subdistichiflorous; petioles 8–15 mm. long, deeply canaliculate above; leaves obovate- rarely oblanceolate-oblong, narrowed to petiole, long and subabruptly acuminate, 13–28 cm. long, 5–10.5 cm. wide, membranous, little lustrous, subconcolored, distinctly pellucid punctate, irregularly pinnate-nerved and reticulate, more prominently beneath than above; inflorescence terminal, erect, long-peduncled (peduncle 8–15 cm. long); bracts caducous, linear, gland-tipped, to 6 mm. long, pilose; pedicels 5–9 mm. long, enlarged above; flowers green, densely glandular; sepals strongly imbricate, elliptic-orbicular, coriaceous, scariose-margined, the much larger outer 2 strongly convex, about 14 mm. long, glabrous or sparsely pilose, sericeous within; corolla at anthesis about 22 mm. long, medially connate with wide tube the throat densely pilose within, bilabiate, the lower lip of 4 obtuse parts the 2 inner of these longer and less deeply divided than the 2 outer, the upper lip 1 linear-cuneate longitudinally plicate concave petal; fertile stamens 2, adnate to the tube below

the upper lip, anthers glabrous, connective basally auriculate; staminodia 3, densely lanate as stamens at base; disk cupulate, lightly 5-crenulate; carpels 5, fruit unknown.—*R. pseudalterna* Ducke, l.c. 49, has the apparently alternate leaves opposite a stipuliform appendage or reduced caducous leaf 6–15 mm. long, flowers usually 3–5, composed of 2-flowered cincinni. According to Ducke these two species have the most strongly zygomorphic corolla with bilabiate limb; intermediate in this character are *R. amazonica* Huber, Bol. Mus. Goeldi 5: 423. 1909, with smaller well-petioled leaves, and *R. polygalaecalyx* Ducke, Archiv. Jard. Bot. Rio Jan. 4: 101. 1925, the calyx polygaloid, the leaf-axils barbate within, while the original species of eastern Brazil, *R. infelix* Vell., has weakly zygomorphic flowers, not bilabiate.—Ducke observes that the Amazonian species differ from it further in their entirely green flowers but according to the collector of the 3–5 meter shrub or liana of Peru the flowers were green and white; these have become broken but appear zygomorphic and bilabiate; vegetatively the specimens agree in general with the diagnosis of *R. biramosa*. Apparently *Killip & Smith 28396*, with fruits about 1.5 cm. long. long, 2.5 cm. broad, belong here but are generically aberrant for each cell contains 2 seeds; notwithstanding that the development of 1 or 2 seeds is traditionally used to key out genera related here its importance is probably not basic since 2 ovules in any case may be present, sometimes at least. Standley gave an herbarium specific name (perhaps rightly) to these collections, so imperfect, which I prefer to record as *R. biramosa* Ducke, var. **peruviana** Macbr., var. nov. in axillis petiolorum intus parcissime flavidobarbatis; foliis 12–30 cm. longis, 7–13 cm. latis, late oblongo-ellipticis, vix vel haud obovatis; floribus 3–9 (paullo notatis) simpliciter racemosis vel etiam racemis breviter biramosis, pedunculis solum circa 3–4 cm. longis.—*Klug 3047*, type.

Loreto: Mishuyacu near Iquitos, *Klug 1316*. Balsapuerto, *Klug 2951; 3047; Killip & Smith 28396*. Amazonian Brazil.

17. RUTA L.

Disagreeably pungent herbs sometimes suffrutescent, with terete branching stems, simple or compound leaves and greenish-yellow flowers in terminal leafy bracted corymbs, panicles or cymes. Calyx with 4–5 segments that persist and the same number of petals, these often dentate or ciliate. Torus thick, urceolate, 8–10-glandular or -foveolate with this number of stamens at its base, the alternate shorter. Ovary sessile, 4–5-lobed; ovules pendulous from central

axis. Capsule 4–5-lobed, the lobes, if dehiscent, at apex, and with many angled albuminous seeds.

Ruta chalepensis L. Mant. 69. 1767.

Unpleasantly redolent glaucous perennial herb sometimes forming clumps several dm. tall and becoming woody toward or at the base; leaves bi- or tripinnate or ternately divided, ovate-triangular, the oblongish segments obtuse; sepals entire or crenate, the fringed petals 7–9 mm. long; ovary lobes acute as those of the ovoid capsule, this at maturity 7–9 mm. across.—An occasional introduction, usually in stony places. The similar *R. graveolens* L. may occur; its petals are entire or dentate and the ovary and capsule lobes are rounded.—Illustrated, Fiori & Paol. Icon. Fl. Ital. 297.

Huánuco: Weed at Muña, *3989*.—Junín: Tarma, *Killip & Smith 21784*.—Loreto: Río Itaya, *Williams 173*. Iquitos, *Williams 3552*. Introduced from Southern Europe. "Ruda."

18. DICTYOLOMA DC.

Ashy pubescent shrub with thin bark and hard wood, only faintly bitter when freshly cut, bipinnate leaves of many entire glandular-punctate leaflets and ample supra-axillary cymosely branched panicles mostly near the tip of the stem. Flowers polygamous, all parts 5, the calyx small, the petals lightly imbricate, sericeous, the disk tumid, hirsute, 5-lobed, the filaments with large bifid hirsute scales. Styles connate into 1 with large 5-lobed stigma; ovules 4–5 in each cell. Capsules 5, distinct, compressed, introrsely bivalved, each valve with 3 or 4 very flat suborbicular seeds that are surrounded, except for a narrow cleft, by an elegantly veined wing, the veins mostly radiate but several concentric. The name has been conserved. The genus was once included in the Simaroubaceae.

Dictyoloma peruvianum Planch. in Hook. Lond. Journ. Bot. 5: 583. 1846.

Small tree or shrub with simple trunk commonly 4–6 meters high; leaves 2–4 dm. long with 20 or more pinnae the intermediate ones with 12–15 pairs of lanceolate or narrowly ovate-lanceolate leaflets, the lower and upper pinnae shorter; leaflets canescent puberulent beneath, firm, 3–5 cm. long, 6–12 mm. wide; panicles 5 dm. long or longer, ashy sericeous including the subsessile flowers, these with deeply parted calyx, oblong, shortly mucronulate petals 5 mm. long,

2 mm. wide; ovary densely tomentose-hirsute; capsules about 12 mm. long, half as wide.—Illustrated, Engl. & Drude, Veg. Erde 15: 117.

The leaves are used locally as a substitute for soap but more commonly as a fish "poison"; also recorded (by Buës) as a remedy for gonorrhoea.

Cajamarca: Valley of the Tabaconas near Jaén, 900 meters, *Weberbauer 6161.*—Huánuco: Pozuzo, *Ruiz & Pavón.* Tocache and on the Huallaga, *Poeppig 1878; 2419.*—Junín: Near La Merced, *Killip & Smith 24012.*—San Martín: Tarapoto, *Williams 5530; 6160; Spruce 3888.* Chazuta, *Klug 4090* (det. Standley).—Amazonas: Chachapoyas(?), *Mathews 1657,* type.—Loreto: Yurimaguas, *Williams 4296*(?); *Killip & Smith 27543; Ule 6261.* Balsapuerto, *Klug 3088.*—Cuzco: At 700 meters, *Buës.* "Huaman-samana" (Williams), "achuhua" (Buës). "Barbasco negro" (Spruce).

SIMAROUBACEAE [DC.] Lindl. Quassia Family

Reference: Cronquist, Brittonia 5: 128–147. 1944 (with references to other papers), and l.c. 469–470, a revised key.

Like Rutaceae but the leaves usually pinnate and eglandular at least on the surfaces, bark often bitter, filaments sometimes appendaged, carpels often lightly connate or distinct; Bentham remarked that these are little "differences" but highly characteristic. The family moreover as indicated by Engler, Pflanzenfam. ed. 2. 19a: 364. 1931, contains six sharply defined groups, including in Peru *Picramnia. Brunellia* R. & P. long considered as belonging here is now allied to or included in the Cunoniaceae, which see. Besides the following the Chinese "Tree of Heaven," *Ailanthus altissima* (Mill.) Swingle, Journ. Wash. Acad. Sci. 6: 490–498. 1916 (or possibly but scarcely *A. glandulosa* Desf.; cf. Suringar, Mitt. Deutsch. Dendr. Ges. 41: 45. 1929), commonly cultivated in warm lands, may be grown in Peru and as is its habit elsewhere, may persist; it is a smooth-barked tree with pinnate leaves of 13–25 sparsely serrate lanceolate-ovate leaflets, ciliate but glabrous beneath and small polygamous greenish flowers in large panicles followed in the pistillate trees with ample clusters of reddish samaras 3–4 cm. long.

The South American members of the family provide bitter woods, notably *Quassia,* and some yield violet dyes, particularly species of *Picramnia.* Key after Bentham.

Ovary lobed, the carpels soon distinct and 5.

Stamen filaments unappendaged and as many as the petals.

1. *Picrolemma.*

Stamen filaments appendaged, at least in male flowers, sometimes only at base, and twice as many as petals except *Quassia*.

Flowers unisexual; stigmas separate.....2. *Simarouba*.

Flowers perfect; stigmas united or somewhat lobed.

Leaf rachis winged; petals erect, nearly glabrous..3. *Quassia*.

Leaf rachis not winged; petals somewhat spreading, usually pubescent.....4. *Simaba*.

Ovary entire, the carpels solid even in fruit; styles usually free; stamens as many as petals or sepals.....5. *Picramnia*.

Vegetative Key (*Peru only*)

Leaflets rounded, emarginate or very obtuse, sometimes mucronate or exceptionally and in part acute.

Petals glabrous; flowers unisexual; stigmas distinct.2. *Simarouba*.

Petals pubescent; flowers perfect; stigmas united or lobed. 4. *Simaba*.

Leaflets regularly acute to acuminate.

Leaf rachis winged; flowers large.....3. *Quassia*.

Leaf rachis not winged; flowers 1–3 (5) mm. long.

Flowers to 5 mm. long in narrow irregular panicles. 1. *Picrolemma*.

Flowers usually smaller in racemes or spikes, apparently. 5. *Picramnia*.

1. PICROLEMMA Hook. f.

Reference: Cronquist, Brittonia 5: 143–144. 1944.

A perfectly smooth shrub-tree with simple fistulose trunk, the wood extremely bitter, and imparipinnate alternate leaves with many pairs of entire petiolulate oblong-lanceolate leaflets. Flowers dioecious, small, orange, subfasciculate, pedicellate, ebracteolate, in irregular panicles shorter than the leaves. Male flowers with cupulate 4-lobed calyx, 4 oblong deciduous petals inserted with and opposite to the 4 smooth stamens, the disk obscure; female 5-merous, the stamens rudimentary, disk elevated, ovary 5-parted with spreading lobes, the stout style with capitate stigma; ovules solitary near tip of cell, pendulous. Drupes by abortion solitary, oblong, sessile, obtuse, the mesocarp thin.

Ants often inhabit the hollow stems or branches.

Calyx teeth shorter than the tube; anthers longer than filaments. *P. Huberi.*

Calyx teeth longer than tube; anthers shorter than filaments. *P. Sprucei.*

Picrolemma Huberi Ducke, Archiv. Jard. Bot. Rio Jan. 4: 197. 1925.

Like *P. Sprucei* but leaves with 8–10 pairs of oblique obtuse or subcordate leaflets to 15 cm. long, 6 cm. wide, the rachis not ridged or winged; panicle few-flowered, about 5 cm. long; calyx scarcely more than 1 mm. high, the teeth shorter than the tube; petals 6–7 mm. long, about 1 mm. wide; staminodia 5, linear, longer than the stamens, the large anthers longer than the filaments.—Pistillate flowers and fruit unknown. Sometimes 6 meters high. Huber noted the flowers as very fragrant, Klug as white. F.M. Neg. 12540.

San Martín: *Klug 2657.*—Loreto: Quebrada Grande de Canchahuaya, Ucayali, *Huber 1471*, type.

Picrolemma Sprucei Hook. f. in Benth. & Hook. f. Gen. Pl. 1: 312. 1862. *P. pseudocoffea* Ducke, Archiv. Jard. Bot. Rio Jan. 4: 196. 1925, fide Cronquist.

Shrub 1–several meters high, the leaves with usually 4–9 pairs of elliptic-oblong to ovate or broadly elliptic leaflets mostly 8–18 cm. long, 3–7 cm. wide, usually rounded or obtuse at base, abruptly linear-caudate, the acumen 1 cm. long or longer, the rachis margined or with 2 ridges; panicles ample, open, the staminate 1.5–3 dm. long, pistillate little shorter; calyx about 1 mm. high, the teeth longer than the tube; petals orange, 2.5–5 mm. long; filaments much longer than the small anthers, the staminodia short and broad; fruit brown or reddish, 2–3 cm. long.—Petals orange or yellow, fruit bright orange (Killip & Smith). Illustrated, Mart. Fl. Bras. 12, pt. 2: *pl. 46.* F.M. Negs. 22062; 12542 (both *P. pseudocoffea*).

Loreto: Iquitos, *Killip & Smith 27294.* San Antonio, *Killip & Smith 29482.* Florida, *Klug 1985.* Mishuyacu, *Klug 166; 442.* Amazonian Brazil. "Café-rana" (Huber).

2. SIMAROUBA Aublet

The Peruvian species a large tree, the pinnate leaves with alternate leaflets. Inflorescences dioecious, the staminate larger than the pistillate; sepals 5 (4–6), united at base, the petals the same number, distinct. Stamens appendaged only at base (squamate), 10 (8–12),

in the pistillate flowers reduced or wanting. Carpels usually 5 (4–6), lightly united, with short common style and broad divergent stigmas, 1-ovuled, the ovule pendulous. Fruit composed of several distinct drupes, these often with subapical tips the flesh thin.—Name originally written as above. In herbaria the leaflets are brittle and fall readily.

Simarouba amara Aublet, Pl. Guiana 2: 860. *pls. 331, 332.* 1775.

Leaves with or without a terminal leaflet, the glabrous leaflets usually oblong, cuspidate, 5–10 cm. long, about 2.5–4 cm. wide, with many very fine lateral nerves united near the margin; panicles 3 dm. long or longer, the many white or yellowish-green flowers mostly approximate on the branches; calyx 1 mm. long or shorter, the acute lobes ciliate; petals ovate to lanceolate, about 3.5 mm. long; stamens about 1.5 mm. long, the scales villous (male flowers).

Cronquist, Bull. Torrey Club 71: 229. 1944, from whose work I have compiled, has noted petals as 3.5–4.5 mm. long, anthers 0.7–1 mm. long, the leaves typically rugulose-punctate beneath, dull and glabrous or in var. *opaca* Engl. (*S. opaca* (Engl.) Radlk.) papillate and glaucous beneath, this not, fide Cronquist, as yet known from Peru. The following collections from trees 10–15 meters high.

San Martín: Zepelacio, *Klug 3741.* Near Moyobamba, Weberbauer, 290.—Loreto: Pumayacu, *Klug 3207.* Mishuyacu, *Klug 639; 323.* Near Iquitos, *Tessmann 5431.*—Río Acre: Mouth of Río Macauhán, *Krukoff 5240.* Brazil and Bolivia to Central America; Antigua, West Indies. "Simarouba" (Aublet); "marouba" (Brazil).

3. QUASSIA L.

An extremely bitter shrub or tree much like *Simaba* but with winged petioles and leaf-rachises and with large red tubular flowers borne in simple or branched terminal racemes, the pedicels bracted at base and bibracteolate at the articulate apex. Flowers 5-merous with erect membranous contorted petals, a large columnar torus. Filaments appendaged. Ovary deeply 5-lobed, the styles united.

This, the *Quassia* or one of the "bitterwoods" of commerce is cultivated in adjacent countries, probably also in Peru.

Quassia amara L. Sp. Pl. ed. 2. 553. 1762.

Shrub or becoming a large glabrous tree with pinnate leaves, the winged often red rachis bearing 5 (usually) elliptic-oblong acumi-

nate entire leaflets, narrowed to base, 7–16 cm. long, 2–6 cm. wide, and terminal racemes of large red flowers, the contorted petals about 3 (–nearly 5) cm. long; stamens exserted, the red filaments with white pilose basal appendage; drupes black with pale spot at base, 8–15 mm. long, free from each other on the fleshy red disk.—Illustrated, Pflanzenfam. ed. 2. 19a: 378.

Peru: Probably in cultivation. Brazil; Guiana. "Quassia."

4. SIMABA Aublet

Reference: Cronquist, Lloydia 7: 81–92. 1944 (no descriptions).

Shrubs or trees or if suffrutescent the leaves all basal the leaflets usually opposite and in one species only with terminal leaflet. Inflorescence a simple or mixed panicle; pedicels continuous or with joint at base. Flowers perfect; sepals 4 or 5, more or less united, the petals as many, distinct, pubescent and more or less spreading at anthesis. Stamens twice as many as petals the filaments with pubescent appendage which is sometimes free except at base. Carpels 4 or 5, lightly united, 1-ovuled, the style 1 with entire or slightly lobed stigma. Fruit sometimes with only 1 mature drupe, usually several.

Besides the following, *S. cedron* Planch., the widely cultivated "Cedron," may occur at least in haciendas or parks; it is a tree with 10–15 pairs of usually gland-tipped leaflets pubescent on the midnerve above; the petals are 2–3.5 cm. long, the filament appendages 1–2 cm. long, drupes about 1 dm. long, the tree sometimes 15 meters tall.

Simaba multiflora A. Juss. Mém. Mus. Hist. Nat. Paris 12: *pl. 27*. 1825; 86.

Tree or tree-like; leaves mostly 1.5–2 dm. long with 3–9 oblong- or obovate-lanceolate leaflets, the lateral ones 4–7 cm. long, 2–2.5 cm. wide; inflorescences ample; petals cream colored, 4–7 mm. long, puberulent both sides; filament appendages at most 1.8 mm. long, equaling or longer than the gynophore the free portion much shorter than the attached part; fruit stout, symmetric, 1.5–2.5 cm. long.—The leaflets vary from obovate and rounded at tip, where often minutely mucronate, to lanceolate and acute or rarely even emarginate, the fine lateral nerves faint both sides and obsoletely or obscurely reticulate. Referred with doubt by Engler, Mart. Fl. Bras. 12, pt. 2: 211, to *S. guianensis* (Aublet) Engl., maybe correctly,

sens. lat. Other species are to be expected within Amazonian Peru. Said to grow in lowlands at times inundated; Schunke specimen from a river bank, tree 15 meters tall with trunk circumference of 1 meter.

Loreto: Río Mazán, *José Schunke 254* (det. Cronquist). To Pará and Trinidad.

Simaba paraensis Ducke, Archiv. Jard. Bot. Rio Jan. 4: 195. 1925.

Medium size tree or larger, the new branchlets angulate and finely ashy tomentulose as the leaf-rachises and panicles, the older glabrate ones strongly striate; leaves with petiole to 2 dm. long, the rachis slightly depressed, angulate-dilated, with 3–6 rarely 7 pairs of subsessile obovate-oblong or oblong leaflets, 7 (–10) cm. long, 3 (–3.5) cm. wide, more or less attenuate at base, obtuse or retuse at apex, subcoriaceous, glabrous (often with a few trichomes on midnerve beneath), somewhat lustrous, paler and finely pinnate nerved, very finely reticulate beneath, the darker slender nerves prominent both sides; panicles ordinarily terminal, ample, 3–4 dm. long, the upper branches with simple oblongish bracts; pedicels to 1.5 mm. long; calyx parted to below the middle, the segments acute, barely 1 mm. long; petals 6–7 mm. long, 2.3–3.7 mm. wide (Cronquist), oblong, canescent both sides; stamens about 5.5 mm. long, the villous appendage about 4 mm. long; gynophore 1.5 mm. long, longer than ovary, the style glabrous above.—Flowers unpleasantly scented with valerian.

Río Acre: Tree, 30 meters high, mouth of Río Macauhán, *Krukoff 5276* (det. Cronquist). To Amazonian Brazil.

5. PICRAMNIA Swartz

Shrubs or trees, often bitter, with imparipinnate leaves, the entire leaflets opposite or nearly so, and small glomerulate or racemulose usually dioecious flowers borne from trunks, branches or opposite the leaves in pendulous spikes or racemes that often are greatly elongate. Flower with 3–5 segments and petals, the latter rarely lacking, usually imbricate with inflexed apex and, in the male flowers, opposite, 3–5 smooth inflexed filaments inserted under the disk, this depressed, lobulate. Stamens in female flowers reduced to linear scales, the sunken ovary 2–3-celled, the style with 2–3 recurved lobes stigmatic within or with 2–3 sessile stigmas. Ovules

2, near apex of cells. Drupe olive-shaped, 1–2-celled, the cells 1-seeded, the pendent seed without albumen; embryo undivided.

No Peruvian genus is more in need of general revision than this; in many cases species have been described from partial material or incompletely if not inaccurately; this is particularly true for those proposed by me a number of years ago; nevertheless I give two more new names to races if not species so that they may be included in the following compilation based largely on the accumulated collections from Peru alone, which in many instances will probably be associated with species of other areas when the group is monographed.

Leaves glabrous, at least at maturity.

Flowers solitary; fruiting pedicels to 3 mm. long, ascending, the fruits pilose.....*P. macrostachys.*

Flowers glomerulate at least in part; fruits (known) refracted.

Leaflets shortly acuminate, mostly 1.5 dm. long or longer; flowers orange.....*P. magnifolia.*

Leaflets caudate-acuminate, at most about 1.5 dm. long; flowers red or cream-colored.

Racemes simple; male pedicels nearly 2 mm. long; flowers red. *P. juniniana.*

Racemes often branched; male flowers subsessile; flowers cream-colored.....*P. eosina.*

Leaves pubescent at least beneath on the nerves, rarely only on the midnerve.

Leaflets more or less ovate or elliptic, obviously inequilateral below the middle, mostly 3–5 cm. wide unless *P. corallodendron.*

Sepals about 1.5 mm. long; inflorescence branches divaricate-arcuate, stout.

Pedicels at least female obsolete, in fruit only 1–1.5 mm. long; leaves drying brown.....*P. Krukovii.*

Pedicels at least female 1.5–3 (–10) mm. long; plants usually darkening in drying.

Leaflets more or less oblique at base, rather more elliptic or ovate than oblong.

Sepals about 1.5 mm. long; fruits about 2 cm. long. *P. Martiniana.*

Sepals about 1.75 mm. long; fruits about 1 cm. long. *P. Sellowii.*

Leaflets little if at all oblique at base, oblong-elliptic. *P. corallodendron.*

Sepals about 1 mm. long; inflorescence branches if present often closely ascending or rachis less than 1 mm. thick.

Sepals nearly subulate; leaflets thin-membranous...*P. tenuis.*

Sepals ovate; leaves firm, chartaceous-coriaceous.

Inflorescence rachis very slender, finely strigillose; fruits 1 cm. long.

Leaves chartaceous, mostly 7–9-foliate, little lustrous beneath.....*P. lineata.*

Leaves firmer, often 11–15-foliate, very lustrous both sides.....*P. Spruceana.*

Inflorescence rachis very strigose, coarse; fruits 2 cm. long. *P. Schunkei.*

Leaflets nearly oblong, oblique near or at base, 18–25 mm. wide (cf. also some forms *P. Sellowii*).....*P. Killipii.*

Picramnia corallodendron Tul. Ann. Sci. Nat. sér. 3. 7: 259. 1847; 236. *P. sphaerocarpa* Planch. in Hook. Lond. Journ. Bot. 5: 578. 1846, fide Engler. *P. Kunthii* Tul. l.c. 267, fide Engler with query.

Shrub, the 3–4 mm. thick branchlets shortly and densely ferruginous-hirtellous; leaves 9–13 foliolate, at maturity 2.5–3 dm. long, the petiole angled, the internodes mostly 2.5–3 cm. long, rusty pilose; leaflets subequal except the little larger terminal one, oblong-elliptic, attenuate to acute tip, acute at 2 mm. long petiolule, typically nearly 1 dm. long, 3 cm. wide, membranous, glabrous and lustrous above, sparsely ferruginous pilose beneath, midnerve sulcate and as the laterals prominent; flowering branches 2–3 dm. long, the glomerulate flowers sessile or pedicelled; bractlets ovate, acute, densely reddish pilose as the pedicels and calyces, the latter with 5 oblong-ovate acute persisting calyx lobes 1.5 mm. long, the linear petals red, about 2 mm. long; fruit obovoid-ellipsoid, sparsely pilose, 13 mm. long, pedicels 1 cm. long.—The Peruvian plant described as var. *peruviana* Engl. l.c. 237, leaflets smaller, the upper 4–5 cm. long, densely ashy pilose beneath; it is possibly *P. lineata*, a juvenile state accounting for the smaller leaflets, denser pilosity. Perhaps *Comocladia loxensis* HBK., Nov. Gen. & Sp. 7: 18. 1824, is an earlier name for the species of Tulasne as suggested by Engler, but the descriptions do not quite agree. Herzog's Bolivian specimen, not seen, is less

pubescent but leaves very old; it may be *P. Killipii*. F.M. Negs. 12547; 35153; 19242 (the var.).

Peru: Without data, *Haenke* (type, var. *peruviana*). Colombia; Ecuador? Bolivia (fide Herzog).

Picramnia eosina Macbr., sp. nov.

Ramulis ignotis; foliis glabris ut videtur solum 5–7-foliolatis; petiolulis arcte verruculosis circa 3 mm. longis; foliolis (terminali incluso) late ellipticis basi breviter haud oblique acutis vel rotundatis, apice subabrupte acuminatis (acumen obtuso circa 2 cm. longo) chartaceis ubique mediocriter nitidulis, 11–15 cm. longis, 5–7 cm. latis, subaequalibus vel infimis plus minusve ovato-ellipticis et brevioribus; nervis venisque utrinque subaequaliter prominulis tenuiter reticulatis; ramulis floriferis ad 1.5 dm. longis 1–1.25 mm. crassis simplicibus vel divaricato-ramosis minute sparseque strigosis; pedicellis 0.5–1 mm. longis; calycis laciniis 5 ovatis subacutis subscariosis paullo strigosis 1.5 mm. longis; petalis 5 oblongo-ellipticis obtusis vix 1.25 mm. longis; staminibus 5 demum circa 2 mm. exsertis.—A 6 meter tree with cream colored flowers which perhaps should be included in the imperfectly known *P. juniniana* with, apparently, different leaf-venation; it resembles greatly the male specimen (*Klug 1051*) which I have referred there but the racemes are much shorter and thicker and there are slight floral differences. The stamens develop unequally in anthesis, 1 (or 2) exserted and with opening anthers while the rest are still included; Roxanna Ferris and Reed Rollins of the Dudley Herbarium, Stanford University, where this number of the Flora has been largely prepared, kindly aided me in dissection of the flowers.

San Martín: Juanjuí, *Klug 3837*, type.

Picramnia juniniana Macbr. Candollea 5: 374. 1934.

A tree to 8 meters high with glabrous branches, the floriferous branchlets sparsely branched, puberulent-pilose, about 1.5 dm. long; leaves 5–7-foliate; leaflets glabrous, chartaceous, lustrous above, broadly ovate-elliptic, except for the elliptic terminal one about 7.5 cm. long, 4 cm. broad, the lower shorter, all caudate- or subcaudate-acuminate, little or not at all oblique at the rounded acute base; nerves scarcely obvious above, not at all impressed but prominent beneath with the strongly reticulate veins; racemes simple, to 3 dm. long; flower buds densely strigose, otherwise unknown.—Possibly related to *P. caracasana* Engl., 236, from which its glabrous

branches and smaller leaflets seem to distinguish it. Doubtless *Klug 1051* belongs here; leaflets to 11 cm. long, 5.5 cm. wide; pedicels to 1.75 mm. long; sepals ovate, minutely strigose, about 1.25 mm. long, longer than the 5 petals; a 3 meter tree with dark red flowers. The rachis of these male racemes is less than 1 mm. thick.

Junín: Puerto Yessup, *Killip & Smith 26377*, type.—Loreto: Mishuyacu near Iquitos, *Klug 1051*. Fortaleza near Yurimaguas, *Klug 2770*.

Picramnia Killipii Macbr., sp. nov.

Ramulis petiolis inflorescentiisque dense molliterque fulvo-pilosis, foliis ad 3 dm. longis 11–15-foliolatis; petiolulis circa 2 mm. longis; foliolis similibus subcoriaceis fere utrinque paullo nitidulis supra glabris vel nervo medio impresso obscure pulverulento venis vix notatis subtus cum nervis tenuiter reticulatis nervo medio dense piloso excepto glabris, anguste oblongis vel paullo ellipticis ad basin valde oblique rotundato-acutis ad apicem subabrupte acuteque acuminatis plerumque 7–8 cm. longis, 18–22 mm. latis; ramulis floriferis ad 4 dm. longis, 2 mm. crassis; pedicellis 1–1.5 mm. longis; sepalis 5, elliptico-oblongis obtusis paullo strigosis 1.75 mm. longis; ovario dense fulvo-strigoso, stigmate late oblongo; bacca immatura sparse pilosa.—My *4832* has black mature nearly glabrous fruits 17 mm. long, 12 mm. thick, pedicels barely 1.5 mm. long. It seems to me that the tree can scarcely be *P. corallodendron* or *Comocladia loxensis* (cf. under the former) as suggested because the leaves clearly are not membranous and the fruits are subsessile or pedicels at most 1.5 mm. long; it may resemble *P. connarioides* Tul. of Colombia, described as having obtuse cordate-oblong leaflets or *P. Martiana* Engl. of Brazil with few leaflets. In naming this species for my friend I record with pleasure his aid in the preparation of this number by the loan of many specimens from the National Herbarium.

Junín: Huacapistana, *Killip & Smith 24170*, type.—Huánuco: Cushi, *4832*.

Picramnia Krukovii A. C. Smith, Brittonia 2: 153. 1936.

Younger branchlets terete, densely ashy puberulent, the petioles and rachises closely strigose; leaves 2.5–4 dm. long, 9–11-foliolate; petiolules 1.5–3 mm. long; leaflets papyraceous, ovate-oblong, 7–13 cm. long (basal shorter), truncate or acute at unequal base, caudate-acuminate, entire, subglabrous above except the puberulent midnerve, densely puberulent beneath especially on the 4–6 arcuately ascending conspicuous secondary nerves, these less prominent above

the reticulate veins rather equally so both sides; inflorescences little shorter than the leaves, 1–5-branched the branchlets ashy puberulent; female flowers densely glomerulate, subsessile; calyx shortly strigose with 5 ovate acute lobes 1.5 mm. long, 0.8 mm. wide; petals 5, membranous, glabrous, oblong-linear, 1.3 mm. long, 0.3 mm. wide; stamens 0.3 mm. long; ovary strigillose; styles bifid, recurved; drupes finally glabrous, blackening, ovoid, 8–12 mm. long on thick pedicels 1.5 mm. long.—Type from 20 meter tree on varzea land, the associated collection from 5 meter shrub on terra firma; related to *P. Sellowii* Planch., from which it differs by its larger leaves and leaflets, its less lax inflorescence and the closer pubescence of all its parts (Smith).

Río Acre: Mouth of Río Macauhán, *Krukoff 5679*, type; also *5615*.

Picramnia lineata Macbr. Candollea 5: 373. 1934.

Differs apparently from *P. Spruceana* chiefly in the leaves, these less lustrous, chartaceous-membranous, nearly glabrous, 7–9-foliate; leaflets acutely caudate-acuminate or also sometimes obtusish, in the type mostly 10 cm. long, 3.5 cm. wide, or in the younger specimens only 6.5 cm. long, 2.5–3 cm. wide; lateral nerves prominent beneath with the reticulate veins; sepals 5, 1 mm. long; pedicels in fruit 5 mm. long, the fruit twice as long.—*Williams 4635*, in bud, is, perhaps, *P. tenuis*. The character of "raised nervation," stressed originally as distinguishing the shrub, is not apparent; the leaflets however are much thinner and less lustrous in comparison with *P. Spruceana*. The type from a tree in open dry loam about 15 meters tall; the crushed leaves yield a violet dye (Williams).

Loreto: Yurimaguas, *Williams 4629*, type; Yarina Cocha, *Tessmann 5478*. "sani panga" (Williams), "ami" (Tessmann).

Picramnia macrostachys [Klotzsch] Engl. in Mart. Fl. Bras. 12, pt. 2: 238. 1874.

Branches cinereous, 3–4 mm. in diameter, the younger angled branchlets and petioles shortly ashy pilose becoming purpurescent, glabrous; leaves 9–11 foliolate, early pilose, at maturity glabrous and 2.5–3 dm. long with internodes 4–5 cm. long; leaflets broadly elliptic, acutely petiolulate (petiolule 3–4 mm. long) but not at all oblique at maturity, attenuate to acumen 1.5–2 cm. long, membranous, entire but narrowly revolute, often 12–15 cm. long, lateral nerves sulcate, ascending, prominent as the reticulate veins; flowering

branches 3–4 dm. long; flowers solitary; pedicels stout, 2 mm. long, puberulent-pilose as the calyces, these with 5 ovate acute lobes 1 mm. long; petals 1.5 mm. long, linear, very thin; ovary appressed ferruginous pilose, stigmas revolute; young fruits pilose, about 8 mm. long, half as thick, the pedicels 3 mm. long.—*P. Spruceana* Engl., 238, Amazonian and similar, has pedicels and oblong-obovoid fruits subequal.

Peru: Possibly. Brazil; British Guiana.

Picramnia magnifolia Macbr. Candollea 5: 376. 1934.

A small tree with gray-barked glabrous branchlets and 5–7-foliate leaves; petiole enlarged at base; leaflets membranous or chartaceous-coriaceous, slightly lustrous, glabrous except sometimes sparsely puberulent on the midnerve both sides, little or scarcely inequilateral, broadly rounded or cuneately acute at base, shortly acuminate, obtusish, oblong- or ovate- to broadly-elliptic or the smallest lowest one subrotund, mostly to about 2 dm. long, 9 cm. wide, but a few nearly 3 dm. long and 11–13 cm. wide; petiolules stout, rugulose, 4–5 mm. long; nerves conspicuous both sides and with the veins especially beneath prominently reticulate; flowers glomerulate, the female including ovary densely rusty pilose, pedicels about 2 mm. long, stigmas spreading-recurved, sepals 0.5 mm. long, male minutely and sparsely puberulent, pedicels slender, 2 mm. long, sepals minute, stamens about 3 mm. long; fruiting branchlets finally glabrate, pendent, 2–4 dm. long; pedicels refracting, to 6 mm. long; fruit oblong-ovoid, early densely reddish-puberulent (or glabrate) crowned by the long more or less recurved stigma.—Immature fruits are 1 cm. long, 6 mm. thick. Tall shrub or small slender tree with pendent branches, 4 meters high, the racemes on trunk or branches below leaves, the bark pale or dark reddish brown; flowers orange-yellow (wine-red, Klug); fruit yellow (Williams) or orange becoming black (Killip & Smith). Description amended to include material cited. The collector recorded that the crushed leaves yield a sap said to be used for healing wounds.

Loreto: Pebas, *Williams 1737*, type; *1879*. Mishuyacu near Iquitos, *Klug 1096*. Balsapuerto, *Klug 2959*. Between Yurimaguas & Balsapuerto, *Killip & Smith 28144; 28366*. Santa Rosa, *Killip & Smith 28793*.

Picramnia Martiniana Macbr. Candollea 5: 374. 1934.

Branchlets and petioles more or less yellowish canescent with appressed trichomes; leaves 9–13 (–17)-foliate with oblong-elliptic

more or less strongly inequilateral leaflets, acutely acuminate, mostly 10–12 cm. long, about 4 cm. wide, chartaceous or chartaceous-membranous, glabrous except for the midnerve above and the lateral nerves beneath, these densely to sparsely hispidulous-pilose, arcuate-ascending, impressed above and laxly reticulate with the veins beneath; petiolules stout, to 3.5 mm. long; flowering branchlets rather stout, as long as the leaf, curved-spreading, finally ascending; pedicels 1.5–3 mm., lightly yellowish pilose as the 5 nearly 1.5 mm. long calyx segments; stigma oblong; fruit finally 2 (–2.5) cm. long, the pedicels 7 mm. long, or apparently longer.—Flowers rose and cream colored (Klug). The rather similar *P. dolichobotrya* Diels, Bibl. Bot. 116: 100. 1937, of central Ecuador has few leaflets very lustrous both sides, fruits densely tomentose.—*Killip & Smith 22955*, much tangled shrub with 17 leaflets, fruits brownish purple, 2.5 cm. long, 2 cm. thick, on pedicels to 15 mm. long, may belong here. The *"Guarea purpurea"* of Ruiz & Pavón, in herb. without locality, that "serves as a violet dye, very beautiful and bright" seems to be this form or *P. lineata*. Slender shrub with pale yellow to dark brown bark, to 6 meters high, in dense forest at 3,500 meters (Williams). At least in foliage apparently near *P. Spruceana* but with stouter flowering branch the branchlets much more spreading at base, mostly longer pedicels and larger leaflets.

San Martín: San Roque, *Williams 6943*, type; *6975* (*6935*); *6968; 7045; 7069*. Juanjuí, *Klug 3850; 4341* (det. *P. lineata* by Standley). —Junín: Near La Merced, 1 meter herb woody below, leaves used as a dye, *Killip & Smith 23858?* (foliage only).—Ayacucho: Río Apurímac Valley near Kimpitiriki, *Killip & Smith 22955* (in fruit).

Picramnia Schunkei Macbr. Candollea 5: 375. 1934.

Branchlets, petioles, leaves beneath on the nerves and inflorescences densely and softly pilose; leaves 11–15-foliate, the leaflets similar or the lower much shorter, moderately inequilateral, the base obliquely subacute, the apex obliquely and obtusely attenuate-acuminate, mostly 9 cm. long and about 3.5 cm. wide, nearly glabrous except for the impressed midnerve above and the lateral beneath, these impressed above, laxly reticulate and prominent as the veins beneath; female flowering branchlets pseudoracemose; flowers (very young) solitary or more or less glomerulate, subsessile; calyx densely pilose-hirsutulous, scarcely 1 mm. long.—A tree differing from *P. Martiana* Engl., 237, in its more numerous smaller and obtusish

leaflets. My collection was from a small montaña tree with scarlet fruits about 2 cm. long, 1.5 cm. thick, the 5 narrowly ovate acute sepals about 1 mm. long, minutely strigose as the 12 mm. long ascending pedicels; pulverized leaves used to color cloth reddish. *P. villosa* Rusby, Descr. N. Sp. S. Amer. Pl. 34: 1920, of Colombia is apparently near but may have narrower subcaudate nearly acute leaflets.

Junín: Chanchamayo Valley, 1,600 meters, *Carlos Schunke*, type. Hacienda Schunke, La Merced, *5667*.

Picramnia Sellowii Planch. in Hook. Lond. Journ. Bot. 5: 578. 1846; 232. *P. pendula* Tul. Ann. Sci. Nat. sér. 3. 7: 262. 1847, fide Engler.

Branches gray-barked the branchlets 3–4 mm. thick; leaves 1.5 dm. long with usually many leaflets the largest of these typically only 4–6 cm. long, 2–2.5 cm. wide, more or less unequal and densely fulvous pilose especially on the nerves beneath even when mature; flowering branches simple or branched, 1–1.5 dm. long or longer; male flowers 2–5, sessile or subsessile, their 5 brown scarious calyx lobes ovate, acute, to 1.75 mm. long, 1.5 mm. wide; petals 2 mm. long, scarcely 0.5 mm. wide, red, sparsely puberulent; filaments 3–4 mm. long; female calyx about 1.75 mm. long; stigmas revolute; fruit ovoid, 1 cm. long, about half as thick, the pedicels about as long.—The variety *latifolia* Engl. from Goyaz, Brazil, has ovate or obliquely shortly acuminate ovate leaflets, 5–10 cm. long, 3–5 cm. wide. So many Peruvian species have been compared to this one of eastern and central Brazil that its description is included, after Engler, as elsewhere. *P. monninaefolia* Rusby, Mem. N. Y. Bot. Gard. 7: 278. 1927, of Bolivia seems ex char. to be nearer this than *P. Spruceana*, to which the author allied it.

Peru: (Possibly). Brazil.

Picramnia Spruceana Engl. in Mart. Fl. Bras. 12, pt. 2: 238. 1874.

Branchlets and petioles densely ashy pilose; leaves about 2 dm. long, 11–15-foliate, the terminal leaflet oblong-elliptic, lateral obliquely oblong, mostly 7–10 cm. long, 2.5–3 cm. wide, all long-attenuate, tip itself obtusish, prominent nerves sulcate, veins reticulate, very lustrous and glabrous both sides except for shortly pilose midnerve; flowering branches slender, subequaling the leaves, 1.5–2 dm. long, pedicels 1–2 mm. long, canescently pilose; calyx lobes 5,

ovate, acute, 1 mm. long; petals linear, 1.5 mm. long, the stamens one-half as long; ovary glabrous, style short, stigma rotund; fruit ovoid-oblong, 1 cm. long, 3–4 mm. thick, black, glabrous, the pedicels 4–5 mm. long.

Peru: Probably. Amazonian Brazil.

Picramnia tenuis Macbr. Candollea 5: 375. 1934.

Branchlets and petioles rusty-ashy puberulent; leaves 7–9-foliate, the leaflets strongly inequilateral, oblique at the rounded or truncate base, shortly and obtusish acuminate, mostly 5–6 cm. long, 3–3.5 cm. wide, the lower subrotund, 1.5–2 cm. long, all thin-membranous, glabrous above except for the pulverulent midnerve and margins, the nerves beneath sparsely pubescent with short somewhat spreading trichomes; nerves and veins reticulate both sides but scarcely prominent, not at all impressed above; flowering branchlets apparently 3 or 4 cm. long; pedicels nearly 2 mm. long; calyx segments and petals nearly subulate, barely 1 mm. long; ovary oblong-ellipsoid; style short but spreading stigmas elongate, oblong-acute.—A species with more distinctive characters than usual, but another that nevertheless is apparently not referable to any other described form. The type was a shrub 3 meters tall. The Schunke specimen, in bud, may be *P. lineata;* flowers green, fruit red, used for ink.

Junín: Capahuanos on Río Pichis, *Killip & Smith 26739*, type.—Loreto: Río Mazán, *José Schunke 97*.

BURSERACEAE Kunth

References: Swart, Med. Bot. Rijks. Univ. Utrecht 90: 211–446. 1942 (Tribe Protieae); Engler, in DC. Monogr. Phan. 4: 1–169. 1883.

Shrubs or trees resembling the Rutaceae but always with resiniferous ducts in the bast or inner bark; furthermore the epitropous ovules are constantly 2, central, collateral and pendulous and the carpels are completely connate.—Swart follows Engler in regarding the Anacardiaceae and the Sapindaceae as more remote, for these families have apotropous ovules. To Engler's bibliography, Pflanzenfam. ed. 2. 19a: 406. 1931, may be added Irma E. Webber, Syst. Anat. Woods Burseraceae, Lilloa 6: 441–465. 1941.

South American species of *Protium* supply the gum "carana"; cf. under *Protium*. The well-known resins Frankincense (*Boswellia Carteri* Birdw.) and Myrrh (*Balsamodendron* and other genera) are Arabian.

Calyx 4–6-dentate or -lobed; petals 5.

Stamens near margin of urceolate disk; calyx cupulate but with 4–6 valvate lobes or teeth; petals free, valvate; fruit a drupe. 1. *Protium.*

Stamens near or under base of annulate disk; calyx small, lobed.

Stamens 8–12; calyx 4–6-lobed, the lobes imbricate.

Petals free, imbricate in bud; fruit dry.....2. *Bursera.*

Petals somewhat coherent below, valvate; fruit a drupe. 3. *Tetragastris.*

Stamens 5, rarely 10, calyx 5-dentate; fruit a drupe. 4. *Crepidospermum.*

Calyx and corolla 3-parted; stamens 3–6 at base of disk.

Petals nearly free; stigmas 3; ovary 2–3-celled; fruit 1-celled. 5. *Dacryodes.*

Petals united below; stigmas 2; ovary 2-celled; fruit 2 pyrenes. 6. *Trattinickia.*

1. PROTIUM Burm. f.

Usually trees, the scattered exstipulate leaves ordinarily imparipinnate, rarely unifoliate, the leaflets petiolulate. Flowers small, polygamous or dioecious, bisexual or unisexual, 4- or 5-merous with more or less connate persistent sepals, free, usually deciduous petals. Stamens inserted beneath the disk, the anthers dorsifixed to basifixed. Pistil well-developed only in the 4–5-celled female flowers. Pyrenes smooth, separated by a thin layer of mesocarp. Embryo straight with contortuplicate and lobed cotyledons.—Name conserved.

Genus supplies incense wood and a white, fragrant resin exudes from many species when the bark is damaged, which is presumably the source of Carana gum or resin, but this according to Swart is not from *P. Carana* March., a doubtful species from Amazonian Venezuela; L. Williams' reference to this species, Field Mus. Bot. 15: 233. 1936, pertains to *P. tenuifolium;* cf. Swart, 375, and F.M. Neg. 35866. A Brazilian name for some species is "Breo branco" (Spruce). Key after Swart.

Disk and ovary glabrous.

Leaves glabrous or trichomes few, scattered....*P. puncticulatum.*

Leaves at least in part obviously pubescent.

Indument villous.....*P. trifoliolatum.*
Indument a puberulence.
Inflorescence shorter than the petioles.....*P. glaucum.*
Inflorescence longer than the petioles.....*P. glabrescens.*
Disk glabrous, ovary more or less pubescent.
Leaves at least in part glabrous or nearly.
Petioles about twice as long as the interjuga...*P. paniculatum.*
Petioles as long as the interjuga.....*P. medianum.*
Leaves at least in part pilose or puberulent.
Indument a puberulence.....*P. Llewelynii.*
Indument a pilosity.
Flowers distinctly pedicellate.....*P. apiculatum.*
Flowers sessile or subsessile.
Inflorescence fasciculate.
Leaves 3–4-jugate.....*P. tenuifolium.*
Leaves 2–3-jugate.....*P. peruvianum.*
Inflorescence paniculate or racemose.
Leaves 3–5-jugate.....*P. neglectum.*
Leaves 8–12-jugate.....*P. subserratum.*

Protium apiculatum Swart, Recueil Trav. Bot. Néerl. 39: 201. 1942; 370.

Branchlets stout, to 7.5 mm. thick, early reddish tomentulose, the many lenticels elliptic; petioles tumid at base, 7.5–23 cm. long, puberulent as the rachises and the petiolules, the latter 7.5–15 mm. long or the terminal ones 3 or 4 times as long; leaves mostly 3-jugate, usually 3.5–4 dm. long, the interjuga 1.5–6 cm. long, the basal one the shortest; leaflets subcoriaceous, glabrous and lustrous above, subglabrous and dull beneath, with 10–17 pairs secondary nerves, these as the primary sparsely pilose and prominent beneath; leaflet blades lanceolate-oblong to oblong-elliptic, usually 15 cm. long and a third as wide or the terminal larger and somewhat obovate, the lateral basal ones much smaller, all rather abruptly acuminate, the acumen obtuse but apiculate; inflorescences pseudo-terminal, stiffly branched from base, 1 to 2 dm. long; pedicels 1.5–2.5 mm. long, with the broad bracts and flowers reddish puberulent; flowers 5-merous, 2.5–3 mm. long, yellowish green; calyx lobes obtusish, about one-third as long as the tube; petals marginally papillose; disk 10-lobed, tomentellous as the style, the stigma 5-lobed.

Loreto: Mouth of Río Santiago, *Tessmann 4158.* Surinam.

Protium glabrescens Swart, Recueil Trav. Bot. Néerl. 39: 194. 1942; 320.

Branchlets stout, 4–8 mm. thick, the younger as the petioles, rachises and petiolules minutely reddish pilose, in age scabrous and lenticellate; petioles margined, tumid at base, 6–12 cm. long, the lateral petiolules 7.5–15 mm. long, the terminal to 4 cm. long; leaves mostly 4–5-jugate, 3.5–4 dm. long, the interjuga 2.5–5 cm. long; leaflets lanceolate-oblong but irregular, usually somewhat narrowed to apex the terminal also to base, the lateral oblique, the basal shorter, these all gradually acuminate, the acumen about 1 cm. long, 2.5–5 mm. wide; leaf blade coriaceous, glabrous and lustrous above, scabrous and dull beneath the primary nerves there prominent and pilose; inflorescence laxly branched from base, 5.5–7.5 cm. long, the angled branchlets to 3.5 cm. long; pedicels 2 mm. long, more or less rusty puberulent as the calyx and 4-merous corolla, the former with subobtuse lobes, the latter with oblong-ovate inflexed-apiculate petals; disk 8-lobed, glabrous; stigma 4-lobed, the style very short; drupe ovoid, oblique or 2–3-lobed, acute, 17.5 mm. long, 10–12.5 mm. thick, with fleshy mesocarp and thin woody endocarp, the pyrenes 1 to 3.—Large tree 20–30 meters tall.

Río Acre: Near mouth of Río Macauhán, *Krukoff 5468* (or *5486*), Brazil. "Almesca."

Protium glaucum Macbr. Candollea 5: 379. 1934; 313.

Branchlets rather stout, ashy puberulent, later glabrate; petioles 3–9.5 cm. long, scarcely tumid at base, sparsely and minutely pilose as also the rachises and the petiolules, these flattened and bisulcate above, 7.5–10 mm. long, the terminal to three times as long; interjuga angled, 4–4.5 cm. long; leaflets 2 or 3 pairs, lanceolate to oblong, mostly 12.5–15 cm. long, 5–6 cm. wide, the terminal larger somewhat narrowed both ends, the lateral suboblique, the basal ones shorter, all abruptly acuminate, the acumen sublinear, 4 mm. long and wide; leaf blade subcoriaceous, glabrous, slightly lustrous, glaucous, dull and green beneath; secondary nerves 15–16 pairs, prominent as the primary beneath and glabrous; inflorescence axillary, branched from the base, 2–5 cm. long, the many sparsely puberulous branchlets to 1 cm. long; pedicels stout, 2.5 mm. long, glabrous; bracts obtusely acuminate puberulent; flowers 5-merous, 4 mm. long, completely glabrous greenish; calyx 1 mm. high, its broadly ovate lobes obtusely acuminate; petals oblong-triangular, acute, inflexed-apiculate, fleshy; stigma sessile, 5-lobed.

Williams, Field Mus. Bot. 15: 233. 1936, has given the anatomy of the wood which he noted was used for fuel; the tree attained 12 meters with pale gray or dark purplish-brown bark. F.M. Neg. 78495.

San Martín: Juanjuí, *Klug 3821.*—Loreto: Santa Rosa, Yurimaguas, *Williams 4772,* type.

Protium Llewelynii Macbr. Candollea 5: 378. 1934; 355.

Tree to 20 meters high with the general character of *P. paniculatum;* branchlets about 2.5 mm. thick; petioles semi-terete, slightly tumid at base, 3–7.5 cm. long, rather densely brown puberulent as the rachises and the petiolules, these 3–8 mm. long, the terminal to twice as long; leaves 2–3 dm. long, the interjuga 2–5 cm. long, the 3–5 pairs of oblong-lanceolate leaflets rather abruptly linear-acuminate, mostly 10–12 cm. long, about 3.5 cm. wide, with 12–15 pairs of secondary nerves, the primary ones pilose; inflorescences to 10 cm. long; flowers yellowish, more or less puberulent, 5-merous, 3–3.5 mm. long; calyx lobes obtusish, nearly as long as the tube; petals marginally papillose; disk 10-lobed; ovary puberulent, the style half as long with a 5-lobed stigma; drupe oblique-ovoid and monopyrenous or globose, 2- to 4-lobed and 2- to 4-pyrenous, reddish puberulent, 2 cm. long, 1.5–2.5 cm. thick, the endocarp crustaceous. Williams, Field Mus. Bot. 15: 234. 1936, has given the anatomy; the type tree had an open crown, the trunk strict for 4 meters and with reddish-brown fairly smooth bark, the inner fibrous. F.M. Neg. 78477.

Loreto: Near Iquitos, *Llewelyn Williams 3704,* type. Bolivia; Brazil; Venezuela. "Breu" (Krukoff).

Protium medianum Macbr. Candollea 5: 377. 1934; 347.

Apparently very similar to *P. paniculatum;* petioles only as long as interjuga; leaves pergamentaceous with 2 pairs of rather abruptly acuminate leaflets and 10 pairs of secondary nerves; inflorescences sometimes solitary; flowers 4-merous, the calyx lobes twice as long as the tube; petals marginally papillose; ovary with a few rather long trichomes.—Williams, Field Mus. Bot. 15: 234. 1936, has given the anatomy; the Williams collection was from a tree about 15 meters high, the rather smooth trunk-bark pinkish or dark brown, the inner bark only slightly fibrous.

Loreto: Mishuyacu, *Klug 270,* type; *Williams 3792.*

Protium neglectum Swart, Recueil Trav. Bot. Néerl. 39: 203. 1942; 380.

Allied to *P. tenuifolium* but the inflorescences always solitary in the axils and stiffly paniculate, 5–18 cm. long; leaves sometimes 5- or 6-jugate, the basal interjuga mostly shorter than the others; secondary nerves 8–13 pairs; leaflets not or only slightly narrowed to tip, abruptly to rather abruptly acuminate; calyx and corolla sparsely puberulent to nearly glabrous; drupes to 2 cm. long and thick.—A shrub or tree said to attain 21 meters and according to Swart variable with 4 recognizable varieties; if the species rightly includes *P. sessiliflorum* (Rose) Standl. this is the earlier and therefore the valid name, and the cognomen *P. neglectum* is superfluous or at most should be treated as a variety.

Río Acre: Near mouth of Río Macauhán, *Krukhoff 5736*. Apparently to Trinidad and Central America.

Protium paniculatum Engl. ex Mart. Fl. Bras. 12, pt. 2: 270. 1874; 345.

Branchlets about 4 mm. thick, early densely reddish puberulous later scabrous and dotted with elliptic lenticels; petioles flattened only near tumid base, 4.5–11.5 cm. long, glabrous, or nearly like the 2 or 3 interjuga, these 3–5 cm. long, the stout grooved petiolules 5–15 mm. long or the terminal twice as long; leaves 2.5–4.5 dm. long, the 2 or 3 pairs of lanceolate-oblong to oblong-elliptic leaflets more or less coriaceous, glabrous, sometimes lustrous both sides, with 13–16 pairs secondary nerves, these as the primary grooved above, prominent beneath; leaflets mostly 12–20 cm. long, 5–7 cm. wide, all gradually acuminate; inflorescences fascicled in the axils and about terminal, branched from base, 10–35 cm. long or longer; pedicels 1.5–2.5 mm. long; calyx lobes acute, about as long as the tube; disk 8-lobed, glabrous, the short style 4-lobed as the appressed-sericeous ovary; drupe ovoid, 2–4-lobed, acute, 3 cm. long, 2–3 cm. thick, with 2–4 pyrenes.—The Peruvian tree, said to attain 18 meters is var. *pentamerum* Swart with 1–3 pairs of irregular leaflets, the tertiary nerves more prominent, the flowers 5-merous, yellowish brown. Illustrated (as *P. Riedelianum* Engl.), l.c. *pl. 56*. F.M. Neg. 32389.

Loreto: Mishuyacu near Iquitos, *Klug 348* (type, the var.). Brazil.

Protium peruvianum Swart, Recueil Trav. Bot. Néerl. 39: 202. 1942; 377. *P. tenuifolium* Engl. var. *brevicalyx* Engl. in DC. Monogr. Phan. 4: 77. 1883.

Similar to *P. tenuifolium* but the leaves usually 3- sometimes 2-jugate, the petioles, rachises and petiolules rugulose when mature, the terminal leaflets narrowed from the middle to the base (instead of slightly so near the base), the secondary nerves 8–10 pairs and the peduncles and branchlets shorter and stouter; calyx lobes at most one-fourth of the length of the calyx.—Validity needs to be proved by more collections. F.M. Neg. 12583.

San Martín: Near Tarapoto, *Spruce 4473*, type. Between Moyobamba and Tarapoto, *Raimondi*.

Protium puncticulatum Macbr. Candollea 5: 377. 1934; 276.

Glabrous except the sparsely rusty puberulent pedicels, bracts and calyces; branchlets striate, marked with oblong pale brown lenticels; petioles terete, at least twice the length of the interjuga, these 2.5–4.5 cm. long; petiolules 5–10 mm. long, the terminal 2–3 cm. long; leaflets 2–4 pairs, lanceolate to lanceolate-oblong, rarely subovate, usually 10–14 cm. long, 3–5 cm. wide, the basal much shorter than the terminal, these narrowed to base, the lateral cuneate and slightly oblique, all gradually acuminate with an acumen 5–7.5 cm. long, 2.5–3.5 mm. wide, chartaceous, lustrous above, dull beneath, pale green, slightly punctate, primary nerves prominent both sides, the secondary 10–13 pairs conspicuous beneath; inflorescence glomeruliform, 1–1.5 cm. wide, the puberulent branchlets to 7.5 mm. long, pedicels 4 mm. long, bracts and bractlets ovate-elliptic, acute; flowers 5-merous, 3–4.5 mm. long; calyx cupuliform, the 5 teeth minute; petals oblong-ovate, rather fleshy, with acute apiculate-inflexed tip; disk annular, 10-lobed; drupe globose, 3–4-lobed, acute, mesocarp thin, fleshy, endocarp thin, brittle, woody, pyrenes 3 or 4.—Tree sometimes 15 meters tall, the reddish or purplish-brown bark with broad low ridges (Williams).

Bark and fruit furnish a yellow resin used for caulking canoes (Williams).

San Martín: Juanjuí, *Klug 4217*.—Loreto: Pongo de Manseriche, *Tessmann 3453*. Yurimaguas, Parana Pura, *Williams 4625*. Santa Rosa, *Williams 4861*, type. "Copal caspi."

Protium subserratum Engl. in DC. Monogr. Phan. 4: 89. 1883; 386.

Branchlets 10–15 mm. thick, early more or less reddish puberulent, in age glabrate and lanceolate-lenticellate; petioles somewhat tumid at base, 7–17 cm. long, reddish puberulent like the rachises

and petiolules (or glabrate), these 2.5–5 mm. long, the terminals to three times as long; leaves 8–12-jugate, the interjuga 2–4 cm. long, the leaflets lanceolate-oblong, distinctly narrowed from middle to sublinear acumen, broadly acuminate to nearly rounded at base, mostly 11–14 cm. long, 3–4 cm. wide, the basal much shorter, all remotely but distinctly subserrate, pergamentaceous, glabrous and dull both sides, with 14–15 pairs secondary nerves, the primary prominent both surfaces, somewhat puberulent; inflorescences axillary, pseudospicate, 10–24 cm. long, a little if at all branched; pedicels 0.5 mm. or less, more or less puberulent as the calyx, this with oblong acute lobes 3 times as long as the tube; flowers glomerate, 5-merous, yellowish-green to white, 5 mm. long; petals linear-lanceolate, white villous especially on midrib, the margins papillose; disk tomentulose, the globose ovary sericeous with very short glabrous style, the 5-lobed stigma subsessile; drupe ovoid, acute, at least 1 cm. long, nearly as thick, sparsely puberulent, with 1 to 3 pyrenes.—Tree 6–30 meters high, with low buttresses and greenish-yellow or reddish-brown bark, the inner dark and fibrous; in dense forest not subject to regular inundation (Williams).

Loreto: Pongo de Manseriche, *Tessmann 4107*. Fortaleza, Yurimaguas, *Williams 4417*. Brazil; British Guiana.

Protium tenuifolium Engl. in DC. Monogr. Phan. 4: 76. 1883; 375.

Branchlets stout, 4 mm. thick, soon glabrous; petioles semiterete, 7.5–15 cm. long, the interjuga 3–5 cm. long; petiolules 6–15 mm. long or the terminal to 3 times as long; leaves usually 3–4-jugate, glabrous (essentially), pergamentaceous, somewhat lustrous, papillose and scabrous above, each lanceolate-oblong or oblong-elliptic leaflet with 12–16 pairs of secondary nerves which with the primary are prominent beneath, or rarely leaflets lanceolate with 19 pairs of secondary nerves, all with linear acumen 5–10 (13) mm. long, the blades mostly about 14 cm. long and a third as wide; inflorescences fasciculate, 5–9 cm. long, pseudospicate or pseudoterminal and laxly paniculate and then to 2 dm. long; flowers glomerate, sessile, usually 5-merous, 3–4 mm. long, yellowish-white, more or less minutely puberulent without; calyx lobes acute, long as the tube; petals marginally papillose; disk densely tomentose as the ovary, the terete glabrous style with 5-lobed stigma; drupe oblique-ovoid to globose, acute, sparsely pilose, 1–1.5 cm. long, 5–15 mm. thick.—Some Peruvian material was referred to *P. Carana* March., an imperfectly known tree of

Venezuela; cf. Swart, l.c. 390. Slender tree sometimes about 10 meters high, the crown spreading, the slender trunk unbranched for several meters, bark reddish-brown to purple, fruits reddish-pink, heavily resinous; common on Tarapoto plain and at Lamas around 1,500 meters (Williams). F.M. Neg. 32390.

San Martín: Lamas, *Williams 6423*. Tarapoto, *Spruce 4194; 4473, Williams 5708; 6138; 6289*. Juan Guerra, *Williams 6819*. Juanjuí, *Klug 3786*.—Loreto: Near Yurimaguas, *Killip & Smith 28227; 28938; 28962*. Puerto Actino, *Williams 5056; 5356*. Chorillos, Río Ucayali, *Tessmann 3085*. Bolivia; Columbia; Brazil?

Protium trifoliolatum Engl. ex Mart. Fl. Bras. 12, pt. 2: 266. 1874; 309. *P. Martianum* Engl. l.c. *P. titubans* Macbr. Candollea 5: 379. 1934.

Younger branches as the petioles, rachises and the primary nerves more or less rusty villous with spreading trichomes, these of two lengths usually closely intermixed, glabrous or slightly scabrous at maturity; leaves commonly 1- or 2-jugate, 13–22 cm. long, the interjuga 2–4.5 cm. long, the leaflets oblong or oblong-elliptic, 7–12 cm. long, 2–5 cm. wide, or the terminal larger, the lateral subopposite, rather abruptly acuminate, with linear acumen 5–10 mm. long; petioles dilated above, tumid at base, 1.5–3 cm. long; leaf-blade chartaceous, slightly lustrous above, dull beneath, the primary nerves grooved on each side above, the secondary depressed, both prominent beneath; inflorescence axillary, glomeruliform, 7.5–15 mm. across, the branchlets sparsely pubescent; pedicels 1.5–2.5 mm. long, with a few rusty trichomes, these sometimes also on the bracts and calyx; calyx lobes acute, as long as the tube; petals elliptic-ovate, acute, inflexed-apiculate, glabrous, carnose; anthers oblong to lanceolate; disk glabrous; stigma sessile to subsessile, 4-lobed; drupe oblique-ovoid and monopyrenous or ellipsoid, 2–4-lobed and 2–4-pyrenous, acute both ends, 15–17.5 mm. long, 10–20 mm. thick, the mesocarp fleshy, the endocarp thin, brittle, woody.—Somewhat variable in pubescence but the primary nerves in any case villous on both sides and the glabrous flowers 4-merous. A shrub or small tree sometimes 12 meters high, the branches possibly clambering.

Loreto: Near Iquitos, *Williams 1521* (type, *P. titubans*). Brazil; French Guiana.

2. BURSERA L.

Balsamiferous trees, the alternate 3- or more foliate, rarely 1-foliate leaves few or crowded toward the branchlet tips. Leaflets

entire or serrate, often pellucid-punctate, the rachis sometimes wing-margined. Flowers small, sometimes fasciculate, in lateral panicles, these, if elongate, branched. Calyx 4–6-lobed, the lobes imbricate, the minute petals same number, finally reflexed. Stamens 8–12 at base of annulate crenulate disk. Ovary and fruit about as in *Protium* but the former 3 (–5)-celled, stigma 3 (–5)-lobed, the latter a bony often solitary pyrene.

Genus is the source of a fragrant resin known as "copal" in varnish manufacture as in medicine.

Bursera graveolens (HBK.) Tr. & Pl. Ann. Sci. Nat. sér. 5. 14: 303. 1872. *Elaphrium*(?) *graveolens* HBK. Nov. Gen. & Sp. 7: 31. 1824.

Branchlets densely leafy at tips: petioles 1–1.5 dm. long, narrowly winged above the middle; leaflets 2–3 pairs, sessile, oblong, serrate and narrowed to the acute or obtusish tip, entire toward the acute base, the lateral 3–6 cm. long, 2–3 cm. wide, typically glabrous, the midnerve prominent beneath, the lateral nerves and reticulate veins inconspicuous; flowering branches nearly as long as the leaves or about 1 dm. long, paniculate with linear-lanceolate acute bracts; pedicels 5–8 mm. long, much longer than the flowers; calyx glabrous or puberulent, the ovate lobes barely 1 mm. long, the oblong petals 4 mm. long, one-fourth as wide; ovary contracted into a very short style, the ovoid drupes acute both ends, 6–9 mm. long, 4 mm. thick, pyrenes 5 mm. long, about as wide, 3 mm. thick.—Specimens in part forma **malacophylla** (Robinson) Macbr., comb. nov., *B. malacophylla* Robinson, Proc. Amer. Acad. 38: 160. 1902, leaflets lightly short-pilose. A shrub or tree to 15 meters, usually shorter and with low thick trunk; in dry shrub-land with strong old-varnish odor and a suggestion of lemon, the drupes mahogany color (Stork & Horton). The type from Colombia, not Ecuador as often indicated. Weberbauer found a decoction used for stomach ache. F.M. Neg. 35863.

Tumbez: Rainy-green formation, Cancas, *Weberbauer 7753*. Hacienda La Choza, *Weberbauer 7724*.—Piura: Rock slides near base of Cerro Prieto, Amotape Hills, (*Haught & Svenson 11630*); *Haught 30*. Chanro, prov. Piura, *Weberbauer 6001*.—Huancavelica: Wall of Río Huanchuy, 2,600 meters, *Stork & Horton 10439* (det. Standley). Near Pampas, *Weberbauer 6509*. To Galapagos, Mexico, Cuba. "Crispin," "carana," "palo santo," "huancoe" (Weberbauer).

Bursera Klugii Macbr., comb. nov. *Protium Klugii* Macbr. Candollea 5: 378. 1934, fide Swart.

Branchlets, petioles and inflorescence—this little if at all shorter than the leaves—densely fulvous puberulent; petioles 4–6 cm. long; leaflets 4 pairs, subcoriaceous, opaque both sides, the upper lateral oblong-elliptic, obliquely rounded at base, obtusely caudate-acuminate, about 10 cm. long, 3 cm. wide or the terminal 3.5–4 cm. wide, all minutely pulverulent on nerves and prominent reticulate veins; petiolules about 5 mm. long; flowers 2 mm. long, shortly pseudoracemose; pedicels 1.5–2 mm. long; calyx segments ovate, 1 mm. long, puberulent without as the narrow ovate acute petals; ovary fulvous-pilose, well-exserted from thickish, glabrous disk and crowned by short style.—Apparently distinct from any Bursera, to which genus Swart referred it.

Loreto: Mishuyacu near Iquitos, *Klug 806*, type.

3. TETRAGASTRIS Gaertn.

Trees or shrubs, the bark with balsamiferous ducts. Leaves scattered, imparipinnate, 2–5-jugate, the interjuga carinate above and enlarged both ends. Leaflets entire, glabrous, the terminal narrowed to base, the lateral somewhat oblique. Flowers arranged as in *Crepidospermum*, 4- or 5-merous, rarely 6-merous. Corolla sympetalous, tubular. Stamens obdiplostemonous; disk glabrous, lobed. Stigma 4–5-lobed, subsessile. Fruit usually dehiscent, the smooth pyrenes separated by a thick mesocarp and as many as 5, the embryo with plane-convex cotyledons.—Swart helpfully observes that in the herbarium the dark brown leaflets marked with darker brown, nearly black spots and slightly decurrent at base by lack of articulation and the usually more or less cracked fruits with fleshy mesocarp between the pyrenes, are characters that may identify the genus.

Leaves 3.5–6 dm. long, smooth and lustrous.....*T. altissima.*
Leaves 2–3 dm. long, usually scabrous.....*T. panamensis.*

Tetragastris altissima (Aublet) Swart, Med. Bot. Rijks Univ. Utrecht 90: 413. 1942. *Icica altissima* Aublet, Pl. Guian. 1: 342. 1775. *T. phanerosepala* Sandw. Kew Bull. 209. 1932, fide Swart.

Branchlets stout, tomentulose when young, soon glabrate as the foliage; petioles tumid at base, 8–14 cm. long, basal interjuga shorter than the others, all carinate; petiolules 2–7 mm. long, the terminal to 5 cm. long; leaflets oblong to nearly elliptic, about 16 cm. long, 6.5 cm. wide, the basal much smaller, rather abruptly acuminate,

cuneate to rounded at base, coriaceous or somewhat glabrous and lustrous both sides with 12–16 pairs of secondary nerves; inflorescences much branched from the base to 2 dm. long; pedicels stout, 0.2 mm. long; calyx half as long as tube; ovary pilose; drupe 2–5-pyrenous.—The Krukoff specimen from a 30 meter tree on terra firma.

Wood as "Cedre rouge" or "Almesca" said to be prized for furniture and canoes.

Río Acre: Mouth of Río Macauhán, *Krukoff 5608*. To the Guianas.

Tetragastris panamensis (Engl.) Kuntze, Rev. Gen. Pl. 1: 107. 1891; 416. *Hedwigia panamensis* Engl. Bot. Jahrb. 1: 42. 1881.

Much like *T. altissima* but rather more pubescent or scabrous; leaflets gradually acuminate with 10–12 pairs of secondary nerves, usually 11 cm. long, 4 cm. wide; bracts and bractlets smaller, shorter than the calyx, this only one-fourth to one-fifth as long as the flowers, with very short lobes; corolla 5 mm. long, the obtuse recurved lobes two-thirds the length of the tube; ovary glabrous or rarely hirtellous.—The Peruvian plant, cited by Williams as *Protium crassifolium* Engl., is var. *hirtella* Swart, the ovary hirtellous, the drupe sparsely so; the type of this from a tree to 30 meters, unbranched for 10 meters with pale or pinkish, fairly smooth bark (Williams).

Loreto: Yurimaguas, *Williams 4564* (type, the var.). To Central America and the Guianas. "Copal caspi" (Williams).

4. CREPIDOSPERMUM Hook. f.

Shrubs, rarely trees, with balsamiferous branches and branchlets, scattered imparipinnate leaves, the petiolules short, and lanceolate-elliptic acuminate serrate leaflets. Inflorescences subterminal, axillary, the flowers arranged in terminal cymes, the main ramifications racemose. Flowers polygamo-dioecious, usually 5-merous, the calyx synsepalous, its lobes in bud imbricate. Petals free. Disk glabrous as style, the ovary with epipetalous cells, each with 2 subapical collateral epitropous pendulous ovules. Drupe glabrous, balsamiferous, the pyrenes 1-seeded. Embryo hippocrepiform with uncinate cotyledons, the latter both curved to the same side, their upper and lower parts equal in length or nearly so (Swart).

C. rhoifolium (Benth.) Tr. & Pl., possibly coming into Peru from the upper Amazon, has 10 stamens and has been separated as *Hemicrepidospermum* (Tr. & Pl.) Swart, apparently to no one's

advantage or convenience; its leaflets are somewhat longer than those of the following species.

Leaves 3–4-jugate.....*C. Goudotianum.*
Leaves 6–8-jugate.....*C. multijugum.*

Crepidospermum Goudotianum (Tul.) Tr. & Pl. Ann. Sci. Nat. sér. 5. 14: 300. 1872; 400. *Icica Goudotiana* Tul. Ann. Sci. Nat. sér. 3. 7: 372. 1847. *C. Sprucei* Hook. f. in Benth & Hook. f. Gen. Pl. 325. 1862.

Branchlets early densely rusty pubescent; petioles 4–6 cm. long, glabrate in age; petiolules 2.5–3.5 mm. long, the terminal 2–2.5 cm. long; leaflets 3–4 pairs, oblong to elliptic, usually 7–10 cm. long, 3–3.5 cm. wide, lower much smaller, all gradually acuminate, rather densely serrate, glabrous and lustrous above, puberulent and opaque beneath, with 9–12 pairs of secondary nerves, the primary ones prominent both sides and more or less puberulent-tomentose; inflorescences 5–13 cm. long with a few short branches on peduncles nearly half as long, puberulent pedicels 1.5 mm. long, half as long as the flowers; calyx infundibuliform, its lobes acute and once to twice as long as the tube; petals with a few long trichomes without; drupe about 1.5 cm. long, half as thick, the pyrenes rarely 2.—Seldom taller than 4 meters, in loam or scant forest, the lustrous pinkish-brown wood darkening slightly on exposure, odorless, tasteless, fine-textured, easy to work (Williams). F.M. Neg. 12560.

San Martín: Tarapoto, *Spruce 4193* (type, *C. Sprucei*); *Williams 5390.* San Roque, *Williams 7193.* Upper Río Huallaga, *Williams 5636; 5869; Klug 3771.*—Amazonas: Moyobamba, in savannah, *Weberbauer 4502; 4579;* 290.—Río Acre: Mouth of Río Macauhán, *Krukoff 5715.* San Francisco, *Ule 9507.* Colombia. "Isula micunan," "trompetero caspi" (Williams).

Crepidospermum multijugum Swart, Recueil Trav. Bot. Néerl. 39: 205. 1942; 402.

A small tree resembling *C. Goudotianum* but with 6–8 pairs of smaller leaflets, these about 6.5 cm. long, 2 cm. wide, pedicels as long as the flowers and short cupuliform calyx with semiorbicular acuminate lobes as long as the tube.—Swart considered the type locality as in Ecuador.

Loreto(?): Florida, mouth of Río Zubineta, *Klug 2284,* type; also *2004.* Ecuador or/and Colombia (probably).

5. DACRYODES Vahl

Pachylobus G. Don, Gen. Syst. 2: 89. 1832?

Trees with ample, more or less coriaceous, imparipinnate leaves, the leaflets entire, and much shorter axillary panicles of small, polygamous flowers. Calyx cupulate, subtruncate; petals 3, distinct, valvate in bud, firm; stamens 6, inserted at the base of disk, filaments short, flattened. Ovary 2–3-celled, the fruit 1-celled, 1-seeded.—The name of Vahl has priority; the African species to which the name of Don particularly applies probably constitute merely a section or subgroup, the sepals free nearly to base; both the African and American species resemble *Canarium* L. but are said to lack vascular bundles in the branchlets.

Dacryodes peruviana (Loesner) Macbr., comb. nov. *Pachylobus peruvianus* Loesner, Bot. Jahrb. 37: 569. 1906.

Branchlets terete, sparsely lenticellate, early minutely puberulent-papillate; leaflets 4 pairs (petiolules 3–7, terminal to 32 mm. long), obovate to elliptic-lanceolate, unequal, obtuse or broadly cuneate at base, shortly and obtusely acuminate (acumen to 14 mm. long), glabrous, 9–23 cm. long, 4–nearly 10 cm. wide; lateral nerves 14–16; panicles to 22 cm. long, peduncles to 25 cm.; bracts deltoid, 1–2 mm. long, flowers mostly congested in the secondary axils, ultimate pedicels about 7 mm. long; calyx about 2 mm. across; petals semi-ovate, obtuse, 2 mm. long, 1.75 mm. wide; stamens 6 (male flowers), disk obsolete, style conic.—Type a tree to 25 meters high in open wood. F.M. Neg. 12562.

Huánuco: Below Monzón, 700 meters, *Weberbauer 3697*, type; 285.—Cuzco: Cosñipata, 700 meters, *Weberbauer 6960* (det. Melchior).

6. TRATTINICKIA Willd.

Similar to *Tetragastris* but the flowers 3-merous, the fruits indehiscent with nearly connate corrugate pyrenes and with vascular bundles in the medulla of the petioles; embryo with contortuplicate and deeply incised cotyledons.

Abundantly tomentulose.....*T. peruviana.*
Glabrous or essentially.....*T. laxiflora.*

Trattinickia laxiflora Swart, Recueil Trav. Bot. Néerl. 39: 209. 1942; 430.

Small glabrous or essentially glabrous tree 4–8 meters high; petioles 7.5 cm. long, the petiolules 1–1.5 cm. long, the terminal more than twice as long; leaflets mostly 3–4 pairs, broadly elliptic, symmetrical, mostly 11–12.5 cm. long, 6–7 cm. wide, abruptly acuminate with obtuse acumen about 5 mm. long and wide, coriaceous, lustrous above, scabrous beneath with 10–12 secondary nerves; inflorescences laxly branched, few-flowered, 2.5 dm. long, glabrous, or the calyx or deciduous bracts puberulent, the pedicels 4.5 mm. long; calyx campanulate, its acute lobes nearly 5 times as long as the tube; corolla tubular to urceolate, about twice as long as calyx, deep red, papillose or puberulent without, ovate lobes nearly as long as the tube; drupe ellipsoid, acute at both ends, glabrous, 12 mm. long, 8 mm. thick, with 2 pyrenes.

Junín: San Ramón, *Killip & Smith, 24795*, type; also *24906*.

Trattinickia peruviana Loes. Bot. Jahrb. 37: 569. 1906; 427.

A tree with stout early densely tomentulose branches and 6–7-jugate leaves about 3.5 dm. long on petioles 8 cm. long that are tomentose as the rachises and petiolules, these 2–4 mm. long except the terminal 2 cm. long; leaflets oblong to oblong-ovate, usually acuminate, lateral slightly oblique, mostly 11 cm. long, 3.5 cm. wide, the terminal wider, the basal about half as long; acumen acute, to 17.5 mm. long, 5 mm. wide; leaf blade subcoriaceous, scabrous and opaque both sides, also more or less puberulent with about 16 pairs of secondary nerves; inflorescences terminal, 15 cm. long; fruiting pedicels 5 mm. long, the globose or ovoid drupe glabrous or a few trichomes, about 1 cm. thick and with 2 pyrenes.—Type was about 15 meters high.

Amazonas: Near Moyobamba in savannah forest, *Weberbauer*, type; 290. "Caraña."

MELIACEAE Endl.

Reference: C. DC. Monogr. Phan. 1: 399–752. 1878.

Trees or shrubs or at least somewhat ligneous the wood often hard and colored, sometimes fragrant and, exceptionally, with a bitter bark. Leaves mostly alternate, usually pinnate, sometimes pellucid-punctate or -lined; stipules lacking. Flowers usually hermaphrodite, the 4–5 calyx segments commonly imbricate, the 4–5, rarely 3–7, petals free, contorted or imbricate, sometimes connate or adnate with the stamen tube and valvate. Stamens typically 8–10, rarely 5, exceptionally 16–20, the filaments usually connate into a tube that

is entire, dentate or variously lacerate, the anthers sessile or stiped, included or exserted, erect, 2-celled, the connective sometimes produced. Disk varying from annulate to vaginate or pulvinate but the ovary free, often 3–5-celled, obtuse or shortly attenuate into the simple elongate style, the stigmas disciform or pyramidal. Ovules usually 2 in each cell, collateral or superposed, rarely solitary. Fruit baccate, capsular or drupaceous, often dehiscing; seeds with or without endosperm, sometimes winged.

Family noteworthy for fine woods, mostly Indian and African, but true Mahogany (*Swietenia Mahogani* L.) is American; cf. below. Harms, Pflanzenfam. ed. 2. 19bI: 1–172. 1940, gave an excellent account of this important family including keys to some of the woods and much general data with abundant references.

Besides the following the Persian Lilac or Jazmin de Arabia (*Melia Azedarach* L.) is cultivated or apparently sometimes adventive (as at Pozuzo, Tarapoto, Iquitos): it is a densely leafy tree with cicatricose branchlets, the more or less stellate pubescent leaves pinnate or 2–3-pinnate and with unevenly serrate leaflets, the white or purplish flowers suggesting lilac in fragrance borne in open panicles, each blossom with 5 or 6 narrow spreading and curving petals; the fruits are somewhat oliviform. The usual local name is "Flor del Paraiso." Illustrated, Mart. Fl. Bras. 11, pt. 1: *pl. 50.*

Some Sapindaceae may be confused with this group, as *Matayba* for *Guarea*, some Simaroubaceae, as *Picramnia* for *Trichilia* and single-leaved species of the latter, as remarked by Harms, simulate Sapotaceae.

Stamens free, 5 (4–6); seeds winged below; leaflets entire . . . . . 1. *Cedrela.*

Stamens more or less united at least at base, rarely free (*Trichilia*, seeds not winged, stamens 4–10).

Fruit capsular with seeds winged at upper or lower end (top or base of capsule).

Seeds winged below; leaflets serrate . . . . . 2. *Schmardaea.*

Seeds winged above; leaflets entire . . . . . 3. *Swietenia.*

Fruit sometimes capsular but seeds not winged.

Ovules 2–4, superposed in two rows; inflorescence leafy-bracted; anthers included on inner side of tube . . . . . 4. *Carapa.*

Ovules 1–2 in each cell; anthers more or less included.

Anthers at edge of tube (this rarely lobed to base); sepals usually more or less connate, rarely nearly free; disk rarely short-cupulate . . . . . 5. *Trichilia.*

Anthers on inner side of tube; sepals various.

Disk, if developed, stipitiform or patelliform; sepals more or less connate to free.....6. *Guarea.*

Disk obviously but shortly cupulate; sepals free.7. *Cabralea.*

1. CEDRELA [P. Br.] L.

Trees, often becoming tall, with imparipinnate leaves of usually many entire leaflets and small paniculate flowers. Calyx short-tubular with 5 teeth or segments. Petals 5, free or sometimes connate into a carinate torus. Stamens 5, alternate with the petals, free, inserted in the tip of the column; staminodia none or 5 opposite the petals. Ovary sessile in the apex of the column, 5-celled, biseriately 8–12-ovuled, the style terminating into discoid stigma. Capsule septifragal at apex, 5-valved, the valves in 2 layers, the 5-winged axis persisting. Seeds compressed, long-winged, albumen thin.

Next to mahogany "cedro colorado" is the most important timber tree exported from northeastern Peru (Williams, Field Mus. Bot. 15: 46 and 238. 1936; cf. this author for descriptions, especially of the wood, exportation data, and a photograph, l.c. 241). The flowers of some species are known as dye agents.

Poupartia amazonica Ducke according to its author has aspect exactly of Cedrela and may pass for it as "cedro rana" (false cedro), which more properly is the legume *Cedrelinga; Poupartia,* however, has white wood with an unpleasant odor. In some species (at least) of Cedrela the bark, young shoots and flowers are alliaceous in aroma, while the wood itself is fragrant.

Notwithstanding the economic significance, the taxonomy of the group has not been clearly established and the exact application of some of the species names, as well as the range-variability of the species has not been determined. It has seemed expedient to include the names that may apply to the Peruvian forms, and to cite specimens as they have been determined mostly by experts. Cf. Casimir DeCandolle, Ann. Cons. Jard. Bot. Genève: 10. 167–176. 1907.

Petals 5–6 mm. long; leaflets often 5–10 pairs, glabrous or the veins puberulent beneath; petiolules mostly 5–7 (4–12) mm. long, unless *C. odorata.*

Leaflets well-petiolulate.

Calyx lobes rounded; leaflets dull, glabrous.....*C. angustifolia.*

Calyx teeth acute or subacute; leaflets often puberulent beneath.

Calyx 1.5–2 mm. long; leaflets glabrous or nearly. *C. mexicana.*

Calyx 2–2.5 mm. long; leaflets puberulent beneath. *C. longipetiolulata.*

Leaflets (ex char.) shortly petiolulate, glabrous, 8 pairs. *C. odorata.*

Petals 8–9 mm. long (grown); leaflets often more than 8 pairs, more or less pubescent, except *C. Herrerae* subsessile or petiolules to 3 mm. long.

Leaflets more than twice as long as wide.

Petiolules 4–7 mm. long.....*C. Herrerae.*

Petiolules mostly or all much shorter.

Leaflets minutely puberulent or in age glabrate beneath. *C. Huberi.*

Leaflets obviously tomentose at least on veins beneath.

Capsules 3–4 cm. long, shortly stiped.....*C. fissilis.*

Capsules 7–11 cm. long, long-stiped.....*C. macrocarpa.*

Leaflets less than twice as long as wide, obviously tomentose beneath.....*C. Weberbaueri.*

Cedrela angustifolia DC. Prodr. 1: 624. 1824; 739.

Completely glabrous except flowers; branchlets fulvescent-grayish, sparsely lenticellate; petioles about 5.5 cm. long, subterete; leaves about 2.5 dm. long, rachis subtetragonous, with 8–10 pairs of subalternate petiolulate narrowly ovate rather firm opaque leaflets, the upper about 11.5 cm. long, not quite 3 cm. wide, a little unequal at the acute base, moderately long- and acutely-acuminate with 16–18 scarcely prominent secondary nerves; panicles terminal, branched; flowers subsessile, calyx puberulent, obtusely 5-lobed, the lobes rounded, petals elliptic, obtuse, appressed pubescent; ovary glabrous, sulcate, the cells 12-ovuled; style very short; stigma discoid, above 5 sulcate.—Perhaps the earlier name for *C. Herrerae* but ex char. not exactly; furthermore it may not be Peruvian and, so imperfectly known, perhaps the name should be discarded. Cf. also *C. mexicana.* A specimen from the Madrid herbarium grown from seed sent by Ruiz and Pavón from trees cultivated at Lima and Surco may be part of the type but it is without flowers. F.M. Neg. 26439.

Ancash: Yungay, (*Weberbauer 3228*, det. C. DC., *C. mexicana*, det. Harms, in 1930, "could be *C. angustifolia* or new"). Without

locality, "Nova Hispania," herb DC. Prodr., type; also *Dombey 642*, without data.

Cedrela fissilis Vell. Fl. Flum. Icon. 2: *pl. 68*. 1827; Text 75. 1825; 741.

Branchlets not at all (?) lenticellate, fulvescent-velutinous; leaves about 3 dm. long, abruptly pinnate, with 9–12 pairs of opposite subsessile, lanceolate-oblong subequal leaflets the rachis with petiole 6.5 cm. long, sulcate above, velutinous pubescent; leaflets subequal at base, obtuse or acute, acuminate, mostly 1 dm. long, 3.5 cm. wide, subcoriaceous, subopaque but nitidulous and glabrous above, not at all pellucid-striate, more or less tomentose beneath, with about 18 alternate secondary nerves, the terminal panicles half as long, somewhat hirtellous, the ultimate branchlets 1–3-flowered, shortly pedicelled, the flowers subsessile; calyx acutely 5-dentate, pubescent without; petals fulvescent-tomentose both sides, oblong, acute, 9 mm. long; anthers elliptic; ovary glabrous (style as long), the cells 12-ovuled; stigma discoid, included; capsule obovate-oblong, rubescent, pallidly lenticellate, 3 cm. long, scarcely 2 cm. broad.—After C. DC., who designated a var. *glabrior* from the upper Amazon which as to pubescence would care better for many specimens, but it seems probable that the following material, unless species are less restricted, is *C. Huberi* or *C. macrocarpa*, or other.—A 15 meter tree or taller with thick grayish or purplish-brown fairly smooth bark, wood light, used mostly for fuel (Williams).

Huánuco: Cultivated and spontaneous in woods about Monzón, *Weberbauer 3441* (det. C. DC.); 285. Pozuzo, *4663* (det. Harms. affine).—Junín, La Merced, *5400* (det. Harms, same as Weberbauer). —San Martín: Tarapoto, *Williams 5825* (det. Standley). Zepelacio, *Klug 3677; 3696* (det. Standley). To southern Mexico and the West Indies.

Cedrela Herrerae Harms, Notizbl. Bot. Gart. Berlin 11: 382. 1932.

A nearly glabrous tree, the foliage and panicles merely sparsely or evanescently puberulent, the leaves always glabrous and lustrous above; branchlets lenticellate; leaves with petioles 3–4 dm. long or longer, the petiolules 4–7 mm. long; leaflets 8–10 pairs opposite or nearly, obliquely lanceolate or oblong-lanceolate, obliquely rounded or obtuse at base, rather long acuminate or shortly, 7–14 cm. long, 2.5–3.5 cm. wide; panicles ample, much branched, lenticellate, 5 dm. long or longer; flowers minutely pedicellate; calyx 4–5 mm. across,

the sepals connate at base, broadly ovate-suborbicular, rounded or obtuse, minutely pilose; petals oblong-lingulate, obtuse, pubescent, 9 mm. long, 3 mm. wide.—Cf. Harms, l.c. for a long discussion of the possible relationship of this species; apparently it is nearest, if distinct from *C. mexicana* Roem. but that may be founded on a mixture, doubtfully Peruvian. Rather, it may be allied to *C. angustifolia.*

According to Herrera, Revista Sudam. Bot. 1: 21–27. 1934, where there is a good plate, this species forms extensive forests in the Urubamba Valley and is commonly cultivated between about 3,000–4,000 meters. It occurs in two forms: "atoc cedro" attains 15–20 meters, the white porous wood with little odor, and grows along streams; "cedro-virgen," about 30 meters, with a resinous compact pungent wood, grows on hillsides. Both are thought to represent the same species but the wood of the latter is light, valuable for fine furniture.

Cuzco: Valle del Urubamba at Urquillos, 3,000 meters, *Herrera,* type.—Apurímac: Curahuasi, Prov. Abancay, 2,750 meters, *Vargas 1267* (det. Standley, *C. odorata?*). "Cedro," "atoc-cedro," "cedro-virgen."

Cedrela Huberi Ducke, Archiv. Jard. Bot. Rio Jan. 3: 189. 1922.

Tree 30–40 meters high, the moderately rubescent wood fragrant, the branchlets and leaves allium-scented, the former lenticellate and puberulent-tomentulose, the latter glabrous and lustrous above, opaque and on the nerves often puberulent, long-petioled, with 10–14 rarely 8 or 16 pairs of opposite or alternate ovate-oblong subcoriaceous epunctate leaflets, mostly strongly oblique at base, rather long-acuminate, the larger 12–15 (18) cm. long, to 4 (rarely 5) cm. wide; petiolules 2–5 mm. long; panicles tomentulous, often half again exceeding the leaves, with scattered alternate branches, the ultimate often 2–3 (4)-flowered; pedicels 1–1.25 mm. long; calyx ashy puberulent, about 3 mm. broad, the teeth acutish; petals ashy-sericeous, about 9 mm. long; filaments and ovary glabrous, the latter with cells 12-ovulate; stigma discoid; capsules 3–4.5 cm. long, scarcely to 2 cm. across, the stipe about 5 mm. long, the reddish lenticels often confluent.—Easily recognizable by its weakly puberulent leaf nerves, numerous leaflets, a great tree of high argillaceous rocky forests, it furnishes a wood much used for construction, light red, fragrant, considered as one of the "white cedars" but nevertheless called "red cedro" in certain regions (Ducke). Illustrated, Ducke, l.c. *pl. 22a.* (fruit). F.M. Neg. 26443.

Peru: Probably. Amazonian Brazil. "Cedro vermelho," "cedro branco" (Ducke).

Cedrela longipetiolulata Harms, Notizbl. Bot. Gart. Berlin 10: 179. 1927.

Branchlets glabrous; leaves pinnate, to 5 dm. long or longer, with 5–10 pairs of opposite or subopposite leaflets, the petiolules 10–13 (–18) mm. long, glabrous or puberulent (under a lens); leaflets obliquely lanceolate-oblong, ovate-lanceolate or broadly lanceolate, obscurely or somewhat falcate-curved, oblique and more or less rounded anteriorly, often acutely angulate toward the petiolule posteriorly, acuminate, pulverulent beneath (under a lens), lateral nerves 15–20 or more, 6–20 cm. long, 3–6 cm. wide; panicles ample, branchlets divaricate, the ultimate minutely puberulent; calyx pubescent, 2–2.5 mm. long, the broad teeth subacute; petals appressed, subsericeous-pubescent, 5–6 mm. long.—Differs from *C. mexicana* Roem. (cf. C. DC. Ann. Cons. Jard. Bot. Genève 10: 170. 1907) by the larger calyx, from *C. odorata* L. by the long petiolules, more numerous thicker nerves (Harms). Tree-trunk about 11 dm. in diameter, flowers greenish. Fruit and flowers together of this and other species much needed. *C. montana* Turcz., 740, described from Venezuela, has rounded calyx lobes, leaves (in flower) velutinous beneath. *C. bogotensis* Tr. & Pl., 739, has less pubescent leaves, the leaflets subsessile. F.M. Neg. 14382.

Loreto: Open area on the river, Contamana, *Tessmann 3510*, type. "Cedro blanco."

Cedrela macrocarpa Ducke, Archiv. Jard. Bot. Rio Jan. 3: 189. 1922.

Tree 15–25 meters tall, the lenticellate branchlets and panicles sparsely or densely ashy or yellowish tomentose; leaflets 7–15 pairs, opposite or alternate, the adult except for the midnerve, glabrous above, beneath densely short-tomentose or the veins closely hirtellous, mostly strongly oblique at base, to 14 cm. long, 5 cm. wide, or those of flowering branches scarcely more than 1 dm. long; petiolules 1–2 mm. long; pedicels often 2 mm. long; calyx teeth large, subacute; petals to 9 mm. long, green or apically roseate; stamens and ovary glabrous; capsule more or less pale-lenticellate, 7–11 cm. long, 3–5 cm. across, gradually attenuate at base into an obconic stipe about 2 cm. long.—Distinguished from other species by the form and size of its capsule; the wood is variable in the deepness of the color, but always fragrant; inhabits rather medium forest of

dry places in argillaceous terrain, the bark and especially the branchlets and leaves strongly redolent of Allium (Ducke). *Williams 4211* has unattached fruits immature but obviously much larger than those of other species; if it belongs here probably other specimens referred to *C. odorata* do also, but they are incomplete. Illustrated, Ducke, l.c. *pl. 22b.* (fruit). F.M. Neg. 26438.

Loreto: Fortaleza, Yurimaguas, *Williams 4211?* (det. Harms, cf. *C. odorata*). Amazonian Brazil. "Cedro colorado" (Williams), "cedro vermelho," "cedro branco."

Cedrela mexicana Roem. Fam. Nat. Syn. 1: 137. 1846.

Becoming a large tree; leaves large, petiolules mostly 8–10 mm. long, slender; leaflets usually opposite, about 10–30, obliquely lanceolate, commonly 7–13 cm. long, 2.5–4.5 cm. wide, long-acuminate, broadly rounded at base on one side, acute on the other, glabrous or nearly or puberulent on the veins beneath; panicles 3 to 3.5 dm. long or longer, lax, the branches glabrous or puberulent, pedicels 1–2 mm. long; calyx 1.5–2 mm. long, sparsely puberulent, lobes acute; petals oblong, acute or obtuse, 5–6 mm. long, velutinous puberulent without, some longer trichomes within, whitish; filaments glabrous; capsule oblong-ellipsoid, about 4 cm. long, the seeds with wing 12–20 mm. long, 5–6 mm. wide.—Often to 20 or 30 meters high, the trunk more than a meter in diameter, usually narrowly buttressed, bark with coarse vertical fissures. After Standley and Steyermark, Fl. Guatemala, Fieldiana: Bot. 24, pt. 5: 448. 1946, which probably represents typical material. But C. DC. interpreted the species as having petals 8 mm. long. It seems probable that this for Peru is, as Harms has written on the Weberbauer sheet, *C. angustifolia* or new.

Ancash: Yungay, *Weberbauer 3228* (det. C. DC.?).—Huánuco: Cani, *3438* (det. Harms? vel. spec. aff.). Northern South America to southern Mexico; West Indies.

Cedrela odorata L. Syst. Nat. ed. 10. 940. 1759; 737.

Glabrous except the petals; branchlets sparsely lenticellate; petioles 5.5 cm. long; leaves abruptly pinnate, about 3 dm. long with 8 pairs of opposite subsessile (?) obliquely oblong-ovate leaflets unequally rounded at base, obtusely cuspidate, to 15 cm. long, 4 cm. wide, the lower smaller, all opaque, rather firm, with about 12 alternate secondary nerves, the rachises lightly sulcate above; panicles shortly peduncled, branched, elongate, the pedicellate cymules

1-flowered; flowers shortly pedicelled, about 6 mm. long, calyx minutely and acutely 5-denticulate or later irregularly 4–5-parted; petals densely and finely puberulent, 5–6 mm. long, subovate-oblong, acute; ovary glabrous, cells 8-ovuled, stigma orbicular; capsule ellipsoid.—After C. DC. In the Williams specimens the leaflets are mostly 10 pairs, lustrous above, pale brown beneath, capsule pale brown at maturity with light-brown scale-like markings (Williams).—Frequently attains 20 meters, at times 40 or more; trunk straight, cylindrical, to 4 dm. in diameter above the fairly large buttresses; bark thick, dark reddish-brown with coarse scales suggesting mahogany; abundant in both low land and upland forests, 100–1,500 meters (Williams). Always in fertile, compact clay; the cedro vermelho (cedre rouge), of Amazonian commerce, in larger part is apparently this species, collected by Ule on Río Acre and also, as young trees, by Huber in the region of the Purús and the Ucayali, these now cultivated at the botanic garden at Pará (Ducke). Harms followed C. DC. and Ducke in referring this tree to the West Indies species *C. odorata;* Herrera, Revista Sudam. Bot. 1: 21. 1934, eliminated the species from Peru. Cf. also *C. bogotensis* Tr. & Planch. under *C. longipetiolulata.* Ruiz and Pavón recorded it from Pozuzo, Panao, Chinchao (all dept. Huánuco), and cultivated near Lima.

Lima: Cultivated, *Soukup 2176?* (or *C. mexicana,* not *C. Herrerae* as distrib.) (probably, Harms).—Loreto: Mouth of the Santiago, flowers greenish, *Tessmann 4639* (det. Harms). Region of the Purús and Ucayali, (*Huber,* fide Ducke). Lower Itaya, *Williams 150; 200* (det. Harms with query).—Río Acre: Seringal, S. Francisco, *Ule 9511* (det. C. DC.). Mouth Río Macauhán, Basin Río Purús, *Krukoff 5400.* Amazonian Brazil; West Indies. "Cedro colorado."

Cedrela Weberbaueri Harms, Field Mus. Bot. 8: 82. 1930.

Branchlets puberulent or pubescent, the younger velutinous-tomentose as leaf-rachises, petioles and younger leaflets beneath; leaves with 3–4 pairs of opposite subsessile ovate-oblong, broadly oblong or ovate leaflets usually at base strongly oblique to broadly rounded, at apex shortly acuminate or obtusish, sparsely velutinous above, densely or laxly so beneath, 5–9 (16) cm. long, 4–6 (9) cm. wide; fruiting rachis velutinous; capsules shortly pedicelled, valves 5–5.5 (8.5) cm. long, 12–15 mm. broad, sparsely lenticellate, column 4.5 cm. long; seeds broadly winged downward, 2–2.5 cm. long or longer.—Without flowers the position of the species is unknown (Harms).

Stork and Horton collection with fruits at least 8.5 cm. long; mine was from an open tree of about 10 meters.

Huánuco: River canyon, Yanano, *3800*, type in part.—Huancavelica: Río Mantaro, *Weberbauer 6568* (type with my *3800*). Dry slopes, Huanchuy Valley, 6-meter tree, *Stork & Horton 10436* (det. Standley).

2. SCHMARDAEA Karsten

Elutheria Roem., not P. Br.

Trees with imparipinnate leaves, the leaflets more or less serrate at least toward the tips, and hermaphrodite flowers in axillary panicles. Calyx parts as petals 4, the latter much longer and contorted in bud, the staminal tube about half as long, 8-toothed at apex with as many anthers sessile in the sinuses, each anther connective prolonged as a slender subulate appendage, long-exserted. Disk stipitiform, the ovary incompletely 4-celled, attenuate to style with discoid stigma; ovules many, biseriate on the 4 parietal septae. Capsule elliptic, narrowed both ends, septifragally 4-valved, the descending compressed seeds overlapping like roofing shingles by virtue of the broad rounded wing that extends downward from the seed-body.—Genus named for L. S. Schmarda, nineteenth century zoologist at Prague.

Schmardaea microphylla (Hook.) Karsten, ex Walp. Ann. Bot. 7: 560. 1869; Bot. Jahrb. 8: 342. 1887. *Guarea*(?) *microphylla* Hook. Icon. 2: *pl. 129*. 1837.

Shrub or tree to 10 meters high; leaflets 3–6 pairs, the upper 4–6.5 cm. long; peduncles 2–3 cm. long; flowers not crowded, greenish or yellowish, 15 mm. long.—A common shrub in the rain forest around 1,800 meters (Weberbauer). Illustrated, Pflanzenfam. 19bI: 69, 70 (after Karsten).

Amazonas: Chachapoyas, *Weberbauer 4322; Mathews 3097; 2128*. Valley of the Utcubamba, *Weberbauer*, 191. Valley of the Marañón, *Weberbauer*, 190. To Colombia and Venezuela. "Curito" (Colombia).

3. SWIETENIA Jacq.

Becoming magnificent trees, the very glabrous abruptly pinnate leaves with opposite petiolulate obliquely ovate-lanceolate acuminate leaflets and small hermaphrodite flowers borne in axillary and subterminal panicles. Calyx parts and petals 4–5, the latter free, im-

bricate in bud. Staminal tube 8–10-dentate the 8–10 anthers connate with it. Disk cupuliform to stipitiform. Ovary free, usually 5-celled, the cells biseriately many ovuled, the ovules pendulous. Fruit a woody erect capsule septicidal from base or top, the seeds long-winged above, albuminous.—Gerard van Swieten, born in 1700 in Leiden, was a pupil of Boerhaave and founded the botanical garden at Vienna.

Mahogany is the finest timber tree exported from Peru; cf. Williams, Field Mus. Bot. 15: 41–46 and 245–249. 1936, for a good and detailed account of it from a commercial standpoint as well as descriptions including the wood, accompanied by photographs and significant bibliography; also Harms, Pflanzenfam. ed. 2. 19bI: 71 and 74. 1940, and Hoy, Economic Geography 22: 1–13. 1946.

Swietenia macrophylla G. King in Hook. Icon. ser. 3. 6: *pl. 1550*. 1886. *S. Tessmannii* Harms, Notizbl. Bot. Gart. Berlin 10: 180. 1927? *S. Krukovii* Gleason, Amer. Jour. Bot. 23: 21. 1936?

Stately glabrous tree; rachises as petioles rather slender, the petiolules 5–12 mm. long, the leaflets 4 or 5 pairs, obliquely oblong-lanceolate or somewhat ovate, often a little falcate, obliquely rounded, especially anteriorly at base, more or less narrowly acuminate, slightly lustrous above, 6–11 cm. long, 3.5–4 cm. wide, acumen 1–1.5 cm. long with very narrow tip; panicles with somewhat angled compressed peduncles 10–17 cm. long; calyx nearly or scarcely 1 mm. high, 2 mm. wide; petals 3–4 mm. long, pale yellowish-green as the staminal tube, the disk carmine, anthers brown; fruit elongate-ovoid, about 15 cm. long, about 8 cm. in diameter at its greatest width the central pentagonal axis about 11 cm. high; seeds red-brown, lustrous, bitter in taste, without the wing 3–3.5 cm. long, 1.5 cm. wide.—After Harms, l.c. and Williams, Field Mus. Bot. 15: 245. 1936, who further describes the Peruvian tree as 30–50 or more meters high, the trunk 1–1.5 meters or more in diameter above the strong narrow buttresses, these to 5 meters high, unbranched one-third to one-half the entire length; bark about 5 cm. thick, scaly, deeply furrowed, reddish-brown, bitter in taste.

S. macrophylla was described from cultivated specimens in the garden at Calcutta, origin probably Honduras. In Trop. Woods, 16: 49–50. 1928, I concurred with Blake's earlier identification of the Peruvian Mahogany as this species (Trop. Woods 6: 1–2. 1926), and from material accumulated since then it seems to me that there is in all probability only one species concerned in our region, perhaps

with unimportant or weak varieties. However, as Harms remarks, Pflanzenfam. ed. 2. 19bI: 71 and 73, the problem can only be solved by study in the field as well as in the herbarium, of more material. Here may be noted the following variation in the above description and that of *S. macrophylla* as described by Standley and Steyermark, Fieldiana: Bot. 24, pt. 5: 459. 1946: petiolules 1.5–7 mm. long; leaflets 4–6 pairs, 8–15 cm. long, 2.5–7 cm. wide, acuminate to long-acuminate, acute and very oblique at base; calyx 2–2.5 mm. wide; petals obovate, white, 5–6 mm. long; capsule a little narrowed at tip. The other species recorded for Peru, *S. Krukovii*, has leaflets that average wider, obliquely truncate at base, almost a little cordate, the veins with a different angle to the margins, the fruit blunt, obscurely constricted above, to 22 cm. long, 10 cm. broad. These data probably point to the variation within a single species, a not surprising amount considering the wide range. In Peru this includes Loreto but not west of Moyobamba, San Martín, according to Williams, and the areas drained by the upper Juruá and Purús, these, from Gleason's viewpoint, the western extension of his *S. Krukovii*. Williams estimated that mahogany occurs in the unexplored basins of the Huallaga, Ucayali and Marañón at approximately one tree per acre; see also Hoy, Economic Geography 22: 1–13. 1946. Best developed in the lowlands, it also grows in upland forests between 300 and 1,100 meters. F.M. Neg. 14362 (*S. Tessmannii*).

San Martín: Río Mayo, near junction with Huallaga, *Williams 6221*. San Roque, *Williams 7725; 7799*.—Loreto: Lower Huallaga, Santa Rosa, *Williams 4868;* also at San Antonio, Upper Itaya and near Iquitos. Middle Ucayali, Yarina Cocha, *Tessmann 5448* (type, *S. Tessmannii*). San Alejandro, *Burgos 45* (det. Standley). Río Itaya, *Barrel.*—Río Acre: Upper Río Jurupary, *Krukoff 5223* (type, *S. Krukovii*). Amazonian Brazil; Central America; Venezuela? "Aguano," "caoba."

4. CARAPA Aublet

Glabrous tree with impari- or abruptly-pinnate leaves of entire epunctate leaflets and small hermaphrodite flowers borne in racemiform panicles at the tips of leafy bracted branchlets, or terminal. Calyx parts as petals 4 or 5, the latter alternate with the former, free, contorted in bud. Stamens 8–10, connate into an urceolate dentate tube, the anthers sessile, included. Ovary on fleshy disk, 4–5-celled, the short style with discoid stigma. Ovules 4–8, biseriate, in each cell. Capsule loculicidal, ligneous, more or less warty, the

large somewhat angled seeds exalbuminous. The name is the native one in the Caribbean region.

The wood is desirable and the seeds are rich in an oil (andiroba) that has or has had a number of commerical as well as medicinal uses.

Carapa guianensis Aublet, Pl. Guian. Suppl. 32. *pl. 387.* 1775.

Sometimes becoming 30 meters high, glabrous even to the flowers in all parts; leaves 3–5 dm. long or longer with 4–7 pairs of opposite or subopposite oblong to elliptic-oblong lustrous coriaceous leaflets, oblique at base, acute and often mucronate, 10–25 cm. long, 4–8 cm. wide; panicles ample, the flowers subsessile with minute rounded sepals and 4 white obovate-elliptic petals about 5 mm. long; staminal tube 3 mm. long; ovary 4-celled with style 1 mm. long, stigma 1 mm. broad; fruit 4-angled, 3–10 cm. across, with about 12 large seeds.—To be expected in Amazonian Peru. According to Guppy and others distributed by sea currents. *C. macrocarpa* Ducke, Archiv. Jard. Bot. Rio Jan. 3: 191. 1922, and *Guarea mucronulata* C. DC. are probably the same; cf. Harms, Notizbl. Bot. Gart. Berlin 10: 246. 1928. Illustrated, Pflanzenfam. ed. 2. 19bI: 78 (fruit), and Mart. Fl. Bras. 11, pt. 1: *pl. 64.*

Peru: Perhaps. To the West Indies.

5. TRICHILIA [P. Br.] L.

Trees or shrubs with 3-foliate or imparipinnate rarely simple leaves, the entire leaflets often pellucid punctate, and usually axillary panicles of racemosely arranged hermaphrodite flowers. Calyx parts 4–5 (3), more or less connate to free with as many erect or spreading petals. Stamen tube 8–10 cleft (infrequently lobed to base, tube thus obsolete), rarely entire, the linear divisions entire or bidentate; anthers exserted. Disk annulate, none, stipitiform or sometimes free. Ovary 2–3-celled the capitate stigma usually with as many lobes, ovules 2 (1) in each cell. Capsule coriaceous, mostly 3-valved, loculicidal, the exalbuminous seeds often with membranous-fleshy aril that is often showy.—The name, from Greek, seems to refer to the 3 parts of the capsule (Harms).

Many Peruvian species are as yet unknown in fruit; pubescence and size of leaflets as well as length of panicles except in extreme development are characters of less importance or constancy than supposed; leaflets, too, apparently may be opposite to alternate in the same species and it is probable that other distinctions used in

the key, as petal-pubescence if not petal-number (as in *Guarea*), are open to question but expedient. It is interesting if true that species with puberulent ovaries develop glabrous capsules as those with densely hirsute or villous ovaries while the latter also in fruit may be long-pubescent.

Among a number of specimens which could be proposed as "new" at least as to Peru, is *Mexia 8051* from Playa de Balsa, Prov. Convención, with narrow lanceolate leaflets, short panicles of glabrous fruits; Standley has given it an herbarium name after the collector; the foliage suggests that of *T. microcarpa* C. DC. and *T. oxyphylla* C. DC.; if it were described before flowers are obtained it would be another name of doubtful status.

Flowers 4.5 (4)–6 mm. long (unknown in type of *T. validinervia*), except *T. guianensis.*

Calyx with rotund imbricate free or nearly free sepals; stamen tube apically 10-filamentose.....*T. eurysepala.*

Calyx subentire to dentate, lobed or cleft in age but divisions not at all imbricate.

Staminal tube more or less deeply lobed; panicles short or about equaling the petioles.

Petals 5; leaflets often more or less pilose beneath.

Leaflets 6–15 pairs, pilose beneath; ovary villous on fleshy stipe.....*T. tomentosa.*

Leaflets 3–5 pairs, glabrous; ovary strigose, sessile.

Panicles stellulate.....*T. mazanensis.*

Panicle indument simple, minute.....*T. guianensis.*

Petals 4; leaflets glabrous unless on the nerves.

Leaflets several dm. long; capsules densely long-tubercled. *T. gigantophylla.*

Leaflets (as known) much smaller.

Capsules (unknown in type *T. flava*) more or less pubescent, often also tuberculate; petals sericeous puberulent, about 5 mm. long.

Anthers (type) sparsely hirtellous; capsules densely long-tuberculate-setose.....*T. Riedelii.*

Anthers villous or pilose; capsules (known) villous-hirsute and irregularly short-tubercled, in some forms obscurely.

Leaflets (type) firm, epunctate.....*T. montana.*

Leaflets membranous, finely puncticulate.
T. flava, T. macrophylla.

Capsules glabrous or nearly; anthers villous; petals (type) 4 mm. long, minutely pulverulent.
T. peruviana.

Staminal tube entire or shortly denticulate; well-developed panicles often half as long as the leaves or longer, the petals 3 or 5; ovary pubescent.

Leaflets subsessile, many; petals 5.

Petals appressed, sericeous-hirsute; leaflets about a third as wide as long.

Leaflets 9–10 pairs, opposite or nearly.....*T. Elsae.*

Leaflets 5–6 pairs, alternate.....*T. Ulei.*

Petals densely villous; leaflets about half as wide as long.
T. solitudinis.

Leaflets petiolulate, 1–3 pairs; petals 3 or 5.

Leaflets villous on nerves beneath; capsules villous.
T. validinervia.

Leaflets glabrous; ovary villous.

Petals 5, about 4 mm. long.....*T. Williamsii.*

Petals 3, about 5 mm. long.....*T. amplifolia.*

Flowers 2–3 (3.5) mm. long; staminal tube entire or shortly denticulate the anthers sessile between the dentations or on them except *T. guianensis.*

Leaves simple; petals 5.....*T. singularis.*

Leaves pinnate.

Panicle indument subhirsutulous, subpatent; petals 4 or 5, glabrous or sericeous; ovary pubescent or glabrous.

Ovary glabrous.

Leaflets acuminate.....*T. guayaquilensis.*

Leaflets rounded at tip.....*T. Weberbaueri.*

Ovary more or less pubescent.

Leaflets 5–7 pairs often less than 7 cm. long....*T. Catigua.*

Leaflets often nearly 10 cm. long or longer.

Leaves glabrous.....*T. Ernesti.*

Leaves villous on nerves beneath.....*T. validinervia.*

Panicle indument fine, appressed sericeous or lacking.

Petals 5 or when connate sometimes appearing fewer, except in *T. guayaquilensis*, about 3 mm. long; leaflets usually 3, often 4 pairs, except *T. Macbrideana.*

Petals about 3 mm. long; calyx after anthesis regular only in *T. Macbrideana.*

Petals sericeous; calyx subentire or regularly dentate; ovary villous.

Calyx obviously dentate; petals valvate; leaflets subsessile.....*T. Macbrideana.*

Calyx subentire; petals high-connate; leaflets petiolulate.....*T. Cardenasii.*

Petals subglabrous; calyx after anthesis often irregularly cleft.

Ovary villous; petals somewhat connate; tube 5-denticulate; leaflets alternate.....*T. tocacheana.*

Ovary appressed strigose; petals valvate; tube deeply parted; leaflets opposite.....*T. guianensis.*

Ovary glabrous; petals valvate; tube 8-denticulate; leaflets alternate.....*T. Ruiziana.*

Petals 2 mm. long, early imbricate, glabrous as ovary; calyx deeply 5-dentate.....*T. guayaquilensis.*

Petals 3 or 4; leaflets usually 2–3 pairs.

Leaflets much wider than 1 cm., typically 2 pairs, apparently often more.

Petals about 3 mm. long, more or less sericeous (ex char.) except *T. tarapotoana;* calyx typically subentire (next 4 species keyed after Harms and C. DC., doubtfully distinct).

Lowest leaflets of each leaf much smaller than the upper.

Panicles simple, much shorter than leaves (type). *T. Poeppigii.*

Panicles compound, nearly as long or longer than leaves.....*T. iquitosensis.*

Lowest leaflets not much smaller or different in shape than upper; inflorescence often equaling leaves.

Petals pale-sericeous puberulent.....*T. alternans.*

Petals sparsely pulverulent (or glabrous?). *T. tarapotoana.*

Petals about 2 mm. long or scarcely so long, glabrous or nearly unless toward base.

Calyx subentire; ovary puberulent....*T. maynasiana.*

Calyx 4-dentate; ovary hirsute.....*T. sexanthera.*

Leaflets narrower than 1 cm.; ovary puberulent. *T. lanceolata.*

Trichilia alternans C. DC. Monogr. Phan. 1: 700. 1878.

Shrub or small tree, glabrous except the flowers, with clay-colored elenticellate branchlets and alternate leaves and leaflets, the former about 5 dm. long, with semiterete rachises and petioles, these about 8.5 cm. long, the latter often 3 pairs, shortly (3–6 mm.) petiolulate, oblong-elliptic, 9–18.5 cm. long, 3–7 cm. wide, equal and acute at base, rather long- and acutely-acuminate, firm, opaque, pellucid-punctate, with about 12 slender opposite secondary nerves; flowers subsessile, ovate in bud, calyx cupulate, entire, puberulent without; petals 4, elliptic-oblong, acute, about 3 mm. long, pale-sericeous without; staminal tube glabrous, acutely denticulate; anthers 6, subacute, glabrous; ovary yellowish hirsute, longer than style, stigma 3-denticulate, small; capsule glabrous, rufescent, oblong-ellipsoid, 2.5 cm. long, about half as thick; plumule densely yellow hirsute, caulicle with two lines of trichomes alternate with cotyledons.—*T. alternans* if distinct may be restricted to the type from Paramaribo, not seen, for the Poeppig numbers were, unless mixed, also named *T. Poeppigii* by C. DC. In most of the material the leaves are shortly and rather abruptly acuminate or merely cuspidate; shrub, 3–4 meters, with white flowers (Killip & Smith). F.M. Neg. 14437 (*Poeppig*).

Loreto: Yurimaguas, *Poeppig 2407;* also *2407D* (fide C. DC.). Yurimaguas to Balsapuerto, *Killip & Smith 28225* (det. Harms). Soledad on Río Itaya, *Killip & Smith 29613; 29750* (both det. Harms). Brazil.

Trichilia amplifolia C. DC. Monogr. Phan. 1: 694. 1878.

Younger branchlets, petioles and flowers including the petals without minutely and finely puberulent; petioles 15 mm. long, canaliculate above, membranous on the margins; leaves to 2 dm. long; leaflets 1–2 pairs, alternate, oblong-elliptic, equally acute at base, acutely cuspidate, upper only slightly larger than the lower, 17 cm. long, 6.5 cm. wide, membranous, glabrous, opaque, pellucid-

punctate with many fine subopposite lateral nerves anastomosing at margin bifurcately; panicles to 2 cm. long, flowers shortly pedicellate; calyx cupulate, entire, puberulent; petals 3, fleshy, elliptic-oblong, acute, about 5 mm. long; staminal tube glabrous, acutely 6-dentate, anthers 6, acute, glabrous; ovary subglobose, densely hirsute, stipe and style glabrous, stigma minute.—The type, in herb DC., is the same number as the type of *T. Poeppigii* in Berlin from Maynas, and the same number is material referred by C. DC. to his *T. alternans*, but ex char. with only 3 petals 5 mm. long.

Loreto: Perhaps at Maynas, Yurimaguas, *Poeppig 2407*, type.

Trichilia Cardenasii Rusby, Mem. N. Y. Bot. Gard. 7: 279. 1927.

Glabrous (except panicles) the slender branchlets finely papillose lenticellate; petioles short with a medial gland above; leaflets mostly 5, oblong-obovate, abruptly short-acuminate, alternate, to 6 cm. wide, 15 cm. long, the smaller on flowering branchlets with petiolules 5–10 mm. long, the 18–20 widely spreading secondary nerves lightly prominent beneath; panicles axillary, peduncled, loosely branched and flowered, the flowers sessile or on very short stout pedicels; calyx crateriform, about 2 mm. wide, the lobes ovate, with broad obtuse tips about as wide as long; petals puberulent, 3.5 mm. long, ovate, obtuse, apically recurved, the tube one-half as long with 10 setaceous awns which, as the anthers, are about one-half as long as tube; fruit (apparently not mature) 8 mm. thick, 6 mm. long, obscurely triquetrous and grooved with a broad summit (Rusby).—Type a large tree from San Buena Ventura, Bolivia, named for the collector; in the collections cited, the leaflets are as many as 9, the panicles 3–10 cm. long, minutely puberulent, the calyx entire or essentially so and the determination therefore is probably doubtful.

Río Acre: Río Macauhán, *Krukoff 5249; 5411; 5451* (all distr. by N. Y. Bot. Gard.). Bolivia.

Trichilia Catigua Juss. in St. Hil. Fl. Bras. 2: 77. 1829; 689.

Branchlets glabrous, lenticellate; leaves about 2 dm. long, rachises glabrous, petioles about 2.5 cm. long, complanate above; leaflets 5–7 pairs, alternate, subsessile, oblong-elliptic, slightly unequal at the acute base, rather obtuse, about 6.5 cm. long, 2.5 cm. wide, puberulent on the nerves above, these alternate, about 16, scarcely prominent beneath the blades, there sparsely appressed pilose; panicles sessile, mostly 3-parted at base, half as long as the leaves,

the bracts decurrent, cymules pedicellate, 1–5-flowered, flowers pedicelled, ovate in bud; calyx acutely 5-dentate, puberulent without; petals 4 or 5, adhering at base, oblong, acutish, clay-colored without, with sericeous trichomes; tube urceolate, glabrous without, acutely dentate, lightly villous at throat within; anthers 7–10, glabrous, oblong-elliptic, obtusish; ovary and style subequal, the former yellow-hirsute; stigma capitellate, 3-sulcate above; capsules narrowly oblong, densely hirsute, 15 mm. long, the solitary seed completely arillate.—Tree or shrub, 30 meters high on varzea land (Krukoff). There may be an earlier name. F.M. Negs. 35885; 26488 (var. *pilosior*).

Río Acre: Seringal San Francisco, *Ule 9510* (det. C. DC.). Río Macauhán, *Krukoff 5626* (apparently). Brazil to Paraguay.

Trichilia Elsae Harms, Nat. Pflanzenfam. ed. 2. 19bI: 115. 1940. *T. grandifolia* C. DC. Notizbl. Bot. Gart. Berlin 6: 500. 1917, not Oliver, Fl. Trop. Africa, 1868, fide Harms, l.c. 110.

Glabrous except the flowers, the branchlets with some minute nearly concolored lenticels; leaves alternate, about 4 dm. long, rachises and petioles 7.5 cm. long, petiolules 2 mm. long; leaflets 9–10 pairs, the lateral opposite or nearly, oblong, obtuse at base, acutely acuminate, to 16 cm. long, 3.3 cm. wide, lower more elliptic, 8 cm. long, 3 cm. wide, all firm, brownish in drying, pellucid-punctate; panicles axillary, long-peduncled, to nearly 3 dm. long, lower branches to 11 cm. long, cymules 2–3-flowered, pedicels minute; buds oblong-ovate, flowers yellowish-white, calyx 1 mm. long, the 5 teeth rounded, petals 5, oblong-triangular, 4.5 mm. long, 1 mm. wide, acute, yellowish hirsute beneath; anthers 10, sessile, 1 mm. long; ovary hirsute, 3-celled, the cells 2-ovuled, style glabrous, stigma subglobose, minutely denticulate.—Section *Moschoxylum*. Harms renamed this as required and kindly acknowledged the aid of his secretary, Fraulein Else Jaster. F.M. Neg. 14453.

Río Acre: Seringal Auristella, *Ule 9518*, type.

Trichilia Ernesti Harms, Notizbl. Bot. Gart. Berlin 9: 432. 1925.

Glabrous or glabrate (in age) except for the laxly pubescent or puberulent panicles; petioles with rachises 4–7 cm. long or longer, petiolules 2–5 mm. long; leaflets (3) 4–5 pairs, alternate or subopposite (rarely opposite), oblong-lanceolate, sometimes oblong or rather oblanceolate, the lowest ones smaller, obtusish or acute, even

cuneate at base, often shortly acuminate, the larger 8–11 cm. long, 2.5–4.5 cm. wide, subchartaceous, often a little lustrous, the many (14–20) lateral nerves rather prominent beneath; panicles many-flowered, 6–15 cm. long, pedicels very short; calyx cupulate, minutely denticulate or broadly lobulate, pubescent, nearly 1 mm. long or slightly longer; petals 5, oblong, acute, pubescent without, 3 mm. long; staminal tube very broad, glabrous except puberulous within above, with 10 linear teeth alternate with the about as long anthers; ovary villous.—To Section *Moschoxylum* and seems separable from several species only by characters of degree; *T. tocacheana* mostly has more definitely toothed calyx, *T. maynasiana* has smoother flowers; *T. Le Cointei* Ducke, Archiv. Jard. Bot. Rio Jan. 3: 130, 191. 1922, has leaves of the same size but weaker developed calyx, smoother flowers (Harms). Small tree or shrub with brownish yellow flowers, the type sheet distributed to the Anacardiaceae. Or apparently to 30 meters, the flowers white (Krukoff). F.M. Neg. 14446.

Río Acre: Seringal Auristella, *Ule 9636*, type. Río Macauhán, *Krukoff 5409*.

Trichilia eurysepala Harms, Notizbl. Bot. Gart. Berlin 10: 246. 1928.

Branchlets minutely puberulent or glabrate; leaf rachises 8–25 cm. long, with 5–9 or more(?) alternate or opposite, oblong or suboval to lanceolate or oblanceolate leaflets 5–11 cm. long, 3.5–5 cm. wide, sometimes oblique and often narrowed to the 3–9 (–15) mm. long petiolule, a little acuminate, papyraceous, glabrous or glabrate, paler beneath, the lateral nerves 6–9 (more in larger leaves), rather prominent; panicles narrowly pyramidal, appressed puberulent including sepals and petals, 5–25 cm. long, branchlets 2–8 cm. long, pedicels 1 mm. long; sepals and petals 5, both imbricate, the former rounded, 2–2.5 mm. long, to 3 mm. broad, the latter shortly unguiculate, nearly obovate or spathulate, 5–5.5 mm. long; staminal tube glabrous unless puberulent at tip where 10-filamentose, anthers 5 rarely 6; ovary aborted, style glabrous, stigma annulate and conico-apiculate.—Two to 8 meters high, with yellowish-white flowers. Compared by author to *T. Moritzii* C. DC., 707, with larger, heavier leaflets, more numerous lateral nerves. Apparently the nerves in *T. Moritzii* are often evenly spaced, mostly 7–8 mm. distant, while in *T. curysepala* they are less uniformly separated, many more than 1 cm. distant. Harms, however, determined the Klug specimens *T.*

Moritzii vel valde affinis; cf. also *T. septentrionalis* C. DC., 705, of the upper Amazon (and allies, Harms, 115), as to types with 8–10 anthers. F.M. Neg. 14447.

San Martín: Pongo de Cainarachi, *Klug 2742*?—Loreto: Flood-free woods, mouth of the Santiago, *Tessmann 4435*, type; also *4355*. Mishuyacu near Iquitos, *Klug 260; 472; 2536* (det. Standley, *T. Moritzii*). Balsapuerto, *Klug 2934*?

Trichilia flava C. DC. in Mart. Fl. Bras. 11, pt. 1: 203. *pl. 59*. Feb. 1878; 651.

Younger branchlets, petioles (about 3.5 cm. long, canaliculate above) and leaf-rachises fulvescent-hirtellous, the first becoming glabrous, rubescent and rugulose; leaves about 21 cm. long with 2 pairs of subsessile alternate oblong-elliptic leaflets mostly about 13 cm. long, hardly 7 cm. wide, the upper subequal, the lower smaller and ovate-elliptic, all equally acute at base, acutely cuspidate, glabrous above, puberulent beneath, firm-membranous, subpellucid, epunctulate (as to type), with 12–14 alternate secondary nerves; panicles 2–3-branched at base, more than half as long as the petiole, the pedicelled cymules 5–6-flowered, bibracteolate at tip, flowers subsessile with membranous cupulate acutely 4-denticulate puberulent calyx; petals membranous, narrowly ovate-oblong, acutely acuminate, 5 mm. long, sparsely sericeous; filaments medially connate, bidenticulate, with the oblong anthers villous as also the ovoid shortly stiped ovary.—Tree 6–15 meters, with reddish-brown fairly smooth bark, the inner breaking into flakes; fairly common in loam among shrubs and second growth at 1,100 meters (Williams). Type from Río Mamoré, Matto Grosso, in flower. Therefore all determinations doubtful; by Harms, except as noted, this material in part with short-tuberculate hirsute capsules. F.M. Neg. 26493.

Junín: Woods along Río Perené, *Killip & Smith 25128*? (capsules appressed villous, obscurely tubercled; cf. *T. montana* var., or *T. macrophylla*).—San Martín: San Roque, *Williams 7180* (form, Harms). Juanjuí, *Klug 3769* (det. Standley, *T. peruviana*). Tarapoto, *Ule 6512* (det. C. DC.).—Loreto: Caballo-Cocha, *Williams 2338;* perhaps also *2368*. Yurimaguas, *Killip & Smith 27693*? Iquitos, *Williams 3697*. Near Mazán, *Mexia 6450* (capsules appressed villous; det. Standley). Left bank, Río Santiago, *Mexia 6309* (capsules short tuberculate-hispid; det. Standley).—Río Acre: *Ule 9508* (det. C. DC.). Brazil. "Chibo-caspi."

Trichilia gigantophylla Harms, Notizbl. Bot. Gart. Berlin 10: 246. 1928.

A small unbranched tree crowned by the large glabrous leaves, the yellowish-green flowers in short panicles crowded on the nodes of the trunk; petioles nearly 3 dm. long, leaf rachis to 5 dm. long; leaflets apparently to 5, alternate or opposite on petiolules 1.5–3 cm. long, obovate-oblong or oblong, often narrowed to the obtuse or acutish base, more or less acuminate, chartaceous, 4–5 dm. long, 2– nearly 3 dm. wide; panicles little branched, 5–7 cm. long, sparsely pilose or glabrate; calyx broadly patelliform, minutely 4-dentate, puberulent, 2–2.5 mm. wide; petals 4, oblong-lanceolate, obtuse, pubescent, 4–5 mm. long; staminal tube glabrous, parted nearly to base into 8 filaments that are apically bearded, nearly concealing the 8 anthers; ovary densely long-hirsute, style apically glabrate, stigma capitate.—Tree 6 meters high, trunk 7 cm. thick.—Suggests *T. macrophylla* Benth., 652, of the Amazon, but that has smaller leaves, axillary panicles (Harms). Fruiting panicles 5–7 cm. long, the submature globose capsules about 5 mm. thick, densely long-tubercled, the tubercles minutely puberulent and apically with 1–3 or few long capillary trichomes (Mexia collection). F.M. Neg. 14449.

Loreto: Mouth of the Santiago, *Tessmann 4227*, type; also *Mexia 6136* (det. Standley). Puerto Arturo, *Killip & Smith 27867*.

Trichilia guayaquilensis C. DC. Monogr. Phan. 1: 682. 1878. *Moschoxylon viride* Rusby, Mem. Torrey Club 6: 18. 1896, fide Harms. *T. alba* C. DC. Bull. Herb. Boiss. sér. 2. 3: 411. 1903, fide Harms.

Glabrous (typically) even to the almost minute flowers including the partly disk-enclosed ovary; branchlets lenticellate; leaves about 3 dm. long with 4 pairs of opposite oblong-elliptic leaflets subequally acute at base, shortly acuminate with obtuse or minutely emarginate tip, the upper little larger than the lower, 11.5 cm. long, 4 cm. wide, all rather firm, pellucid and closely pellucid-punctate and -striate; secondary nerves about 12, rather prominent beneath; petiolules 6 mm. long; panicles branched nearly from base, half as long as the leaves, the flowers globosely crowded before anthesis, becoming shortly pedicelled; calyx very deeply and acutely 5-dentate; petals 5, early imbricate, elliptic, scarious, 2 mm. long; anthers 10, elliptic, a little longer than the shortly denticulate tube.—F.M. Negs. 14455; 14436 (*T. alba*).

San Martín: 8 meter tree with white and yellow flowers, *Klug 4366*. Ecuador; Bolivia; Paraguay.

Trichilia guianensis Klotzsch, ex C. DC. Monogr. Phan. 1: 657. 1878.

Branchlets and petioles finely puberulent, the latter 2.5 cm. long, canaliculate above; leaves about 3 dm. long with 3 (–4?) pairs of opposite subsessile subcoriaceous opaque glabrous leaflets, the upper larger ones lanceolate, acute at base and acutely acuminate, to 2 dm. long, 7.5 cm. wide, the remaining gradually smaller and longer, petiolulate, oblong-elliptic, obtusely and shortly acuminate; secondary nerves alternate, somewhat spreading, about 12; panicles trifid from the base, about equaling the petiole, with crowded subsessile 1–3-flowered cymules, the flowers shortly pedicellate; calyx deeply and acutely 5-dentate, the sepals ovate, puberulent; petals 5, sparsely puberulent (nearly glabrous in Peru), coriaceous, elliptic-oblong, acute; filaments united medially, shortly bidenticulate, villous within above the middle, much longer than the ovate acute villous anthers; disk lacking, the sessile ovary 3-celled, appressed hirsute, equaled by the hirsute style, this with obtuse trigonous stigma; ovules solitary.—Var. *parvifolia* C. DC. has leaves about 1 dm. long, the terminal leaflets 7.5 cm. long, 3.5 cm. wide, and perhaps the doubtful *Klug 993* could belong to it. The Peruvian specimens have more branched panicles and otherwise are scarcely typical; may be noted as var. **seorsa** Macbr., var. nov. floribus glabris fere brevissime pedicellatis.—*José Schunke 348*, type. F.M. Negs. 14454; 26497.

Loreto: Río Mazán, *José Schunke 348* (det. Standley, *T. Ruiziana*). Mishuyacu, *Klug 993?* (det. Harms, aff. *T. tarapotoana* vel aff. *T. propinqua*). British Guiana; Brazil?

Trichilia iquitosensis Harms, Notizbl. Bot. Gart. Berlin 10: 248. 1928.

Branched shrub (or small tree), glabrous or essentially except for the minutely appressed puberulent panicles, these 6–17 cm. long; leaf rachises with petiole 5–11 (15) cm. long, the petiolules 4–6 mm. long, alternate; leaflets 4 or 5, lanceolate-oblong or a little oblanceolate, sometimes oblong, acute at base, acuminate, 9–18 cm. long, 3–7 cm. wide, papyraceous; pedicels very short; calyx patelliform, minute, subtruncate, puberulent; petals appressed subsericeous (or sericeous) pubescent, 3–4 mm. long.—Much branched, about 6 meters high, the flowers greenish-white. Except for the smaller

calyx very similar to *T. Schomburgkii* C. DC., 695 (Harms). Cf. also *T. Poeppigii*, *T. alternans*. Uncommon in dry open patches, the light to dark brown bark of the slender trunk with many small lenticels (Williams). Determinations by Harms. F.M. Neg. 14458.

Loreto: In flood-free secondary wood, *Tessmann 5108*, type. Lower Huallaga, Puerto Arturo, *Williams 5139; Killip & Smith 27789*. San Antonio, Río Itaya, *Killip & Smith 29371*. Mishuyacu, *Klug 1148; 1381*.

Trichilia lanceolata C. DC. Monogr. Phan. 1: 698. 1878.

Glabrous shrub or small tree (ovary puberulent); rachis with petiole, this canaliculate above, barely 1 cm. long, leaves about 12 cm. long; leaves 2 pairs, alternate, narrowly oblong-lanceolate, acute both ends, 8 cm. long, 8 mm. wide, lower shorter, opaque, subcoriaceous, sparsely pellucid-striolate but not punctate at the veins, the slender lateral nerves about 14; panicles subequal the leaves, shortly and remotely branched, bracts coalescent with internodes, branchlets to 1 cm. long, densely flowered, cymules short, pedicelled, 1–3-flowered; calyx cupulate, obtusely 3–4-dentate; petals 3–4, elliptic, acute, scarcely 2 mm. long; staminal tube acutely denticulate; anthers subglobose, glabrous; ovary cells 1-ovuled; stigma minute; capsule oblong-ellipsoid, glabrous, about 1 cm. long; aril red.

Loreto: Near Yurimaguas at the cataracts of the Huallaga, *Spruce 4593*, type.

Trichilia Macbrideana Harms, Notizbl. Bot. Gart. Berlin 11: 785. 1933.

Nearly glabrous shrub or small tree with slender cinereous or brownish branchlets; rachises with the petiole 7–15 cm. long; leaflets 5–7, often alternate, shortly petiolulate or subsessile, mostly oblong-lanceolate, acute or narrowed at base, acuminate, 6–16 cm. long, 2.5–5.5 cm. wide; panicles axillary, shorter than the leaves, often branched at base, glabrous or sparsely puberulent, 4–8 (–13) cm. long; flowers minute; calyx deeply 5-parted, nearly 2 mm. across at the deltoid acute pilosulous teeth; petals 5, valvate, lanceolate-ovate, acute, appressed pilosulous without, nearly 2.5–3 mm. long; staminal tube obscurely pilose at base of the 10 marginal anthers, scarcely denticulate between them; ovary sessile, depressed, villous, the very short style with small capitellate stigma; capsules (young) puberulent, 1 cm. long, 3 mm. thick (*Killip & Smith 28861*).—Very similar to *T. silvatica* C. DC., 691, of Rio de Janeiro with 4 petals

and 6 anthers (Harms). About 3 meters, often branched from base, bark very dark brown with many small lenticels; flowers pale yellow; common in rather dense forest or riverbank thickets (Williams).

Loreto: Caballo-Cocha, *Williams 2231*, type; also at La Victoria, *2524; 2806; 2840; 2849*. Lower Río Huallaga, *Williams 4634*. Puerto Arturo, *Killip & Smith 27870*. Santa Rosa, *Killip & Smith 28861?* (fruit); could be *T. tocacheana*.

Trichilia macrophylla Benth. in Hook. Journ. Bot. Misc. 3: 369. 1851; 652.

Branchlets smooth and glabrous; upper petioles about 3 cm. long, petiolules 4–7 mm. long, leaves 3 dm. long or longer; leaflets alternate in type, 2–3 pairs, oblong-elliptic, acute at base, acutely short-acuminate, the larger terminal, about 2 dm. long, nearly half as wide, all membranous, subpellucid and minutely pellucid-puncticulate, glabrous above, puberulent beneath on the 14 or so alternate ascending secondary nerves, the subterete rachis hirtellous above; fruiting panicles subequaling the petiole, 2–3 branched at base; calyx (fruiting) deeply 4-dentate; capsules about 8 mm. long, short-tuberculate and villous-hispid, with 1–2 erect ovoid seeds per cell basally enclosed in a short membranous aril. The original shrub was thick-trunked.—This and *T. montana* (with *T. pallida* of the West Indies, and Colombia? capsule merely sericeous) are the first names in a group of closely related forms; the most apparent differences are in the fruits but most names are based on specimens in one stage only; the need of complete material from the type localities for correct disposition of the various names is obvious. Huber found this at Ponto Alegré, Alto Purús, Brazil. Illustrated, Mart. Fl. Bras. 11, pt. 1: *pl. 60* (fruit). F.M. Negs. 19255; 35889.

Peru: (probably, sens. lat.). Upper Amazon, Brazil.

Trichilia maynasiana C. DC. Monogr. Phan. 1: 700. 1878.

Glabrous (unless the panicles) including the flowers, only the ovary a little puberulent; branchlets minutely and sparsely lenticellate; petioles and rachises semiterete; leaves about 15 cm. long; leaflets 1 or 2 pairs, opposite or alternate, lanceolate, acute at base, rather obtusely cuspidate, the upper subequal, 7.5 cm. long, 28 mm. wide, membranous, opaque, the younger with pellucid oblong punctae, the lateral nerves fine, spreading, about 16; panicles about equaling the leaves, obscurely pulverulent or glabrous with linear acute bracts coalescent with internodes, the few short branches with

flowers apically glomerate; calyx cupulate, entire; petals 3 or 4, about 2 mm. long, acute; staminal tube 6–8- subulate-denticulate; anthers 6–8; ovary yellow-puberulent, attenuate into short style.—Capsules 12 mm. long, 5 mm. thick (*Mexia 6302* and *Williams 6631*). Determinations by Harms except as noted. Common in low land and to 500 meters in open patches of flood-free forest or in second growth, to 12 meters high, the trunk to 4 dm. in diameter with dark brown bark, scaly in age; flowers pale yellow (Williams). Timber used for general construction. F.M. Neg. 14465.

Loreto: Maynas, *Poeppig* in herb. Berlin, type. Mouth of the Lower Huallaga, *Williams 3997; 4561; 5894?* Above Pongo de Manseriche, *Mexia 6302* (det. Standley). Río Santiago, *Tessmann 4019*. Puerto Meléndez, *Tessmann 3921; 4733*.—San Martín: Morales, *Williams 5743; 5714*. Tarapoto, *Williams 6234; 6631; 6223*. Rumisapa, *Williams 6834; 6777*. Juan Guerra, *Williams 6910; 6905*. Jaunjuí, *Klug 3826* (det. Standley). "Shatona," "uchu-mullaca" (Williams), "chijape" (Mexia, Aguaruna name).

Trichilia mazanensis Macbr., sp. nov.

Ramulis ad apicem minutissime lepidotis; foliis glabris 5–7-jugis circa 3 dm. longis; petiolis 6–10 cm. longis; petiolulis circa 3 mm. longis; foliolis distincte alternis oblongo-ellipticis, basi breviter acutis, apice breviter acuminatis, 12–20 cm. longis, 3.5–6 cm. latis, nervis secondariis subtus prominentibus utrinque circa 12; paniculis axillaribus plus minusve ramosis 3–8 cm. longis mediocriter dense lepidotis; pedicellis 1–2 mm. longis; calyce obtuse 5-dentato, 0.7 mm. longo; petalis 5, subglabris 4–4.2 mm. longis; filamentis basi fere vel ad medium connatis antherisque hirsuto-villosis; ovario villoso.—Section *Choriopetion* Harms, marked by lepidote-stellulate indument and apparently the only species of the section recorded for Peru. The collector found a single tree, that 6 meters tall with trunk 3 dm. in circumference, the flowers white.

Loreto: Gamitanacocha, Río Mazán, *José Schunke 136*, type.

Trichilia montana HBK. Nov. Gen. & Sp. 7: 226. 1825; 654.

Younger branchlets and leaves finely tomentose or pubescent, becoming glabrous or nearly, the latter about 2 dm. long or longer, typically with 1–2 pairs of opposite elliptic or subelliptic firm subopaque epunctate leaflets acute at base, shortly, acutely or obtusely acuminate, the larger terminal about 16 cm. long, 7 cm. wide, with about 8 alternate ascending-arcuate secondary nerves prominent

beneath; petiolules scarcely 2 mm. long; rachises and petioles puberulent, the latter margined; panicles finely pubescent, about as long as the petioles or 3–4 cm., sometimes 2–3 parted from base; calyx cupulate, acutely 4-dentate, sericeous-puberulent; petals appressed puberulent, ovate-oblong, acute, about 4 mm. long; stamen-tube laciniate, the divisions above pilose, as ovate-oblong acute anthers; ovary hirsute; capsules tuberculate-hispid with conical apically long-setose tubercles or in var. *Fendleriana* C. DC., l.c., sparsely tuberculate, densely villous.—In this variant from Venezuela the larger leaflets are oblong-elliptic, 18 by 5.5 cm. and longer petiolulate. In introducing this plant as only a variant it is not clear how one can maintain as species the equally "weak" *T. flava*, *T. Riedellii*, *T. macrophylla*, et al. Maybe better marked, *T. Goudotiana* Tr. & Pl. Ann. Sci. Nat. sér. 5. 15: 366. 1872; 652, capsules simply villous, petals 2 mm. long (or young?). F.M. Negs. 35890; 26504 (*Triana*, fide, C. DC.); 26505 (var.).

Peru: (probably, sens. lat.; cf. note above). Ecuador to Venezuela and Central America.

Trichilia peruviana C. DC. Monogr. Phan. 1: 654. 1878.

Glabrous except for the panicles, the branchlets early greenish, smooth; petioles 3–5 cm. long, semiterete, sulcate above; leaves about 2.5 dm. long with 1–2 pairs of rather firm subpellucid elliptic or oblong-elliptic leaflets, acute at base, acutely and shortly cuspidate, the terminal about 18 cm. long, 6.5 cm. wide; panicles scarcely as long as the petioles, trifid at base, the branches 2–3-fid a little above the base, puberulent, the cymules 1-flowered, bractlets linear-acute, pedicels minute; calyx deeply 4-parted, acute, puberulent, the 4 nearly glabrous petals about 4 mm. long, membranous, yellowish, oblong-elliptic, acutish; filaments connate into a short glabrous tube but villous at apex, within coalescent with cupulate disk and laciniate; anthers villous, oblong; ovary hirsute, the glabrous style as long with stigma equaling the short tube; capsule nearly glabrous, about 8 mm. long.—The Williams collection from a tree to 8 meters high with gray-reddish-brown bark with many low irregular ridges. The original record "Peru & Chile" is doubtless a label error. Harms and C. DC. keep this out of *T. flava* and *T. Riedelii* by "leaflets 1–3 pairs," of course no character at all, but in type the slightly smaller petals are pulverulent and the nearly glabrous capsules not tuberculate. F.M. Neg. 14472.

San Martín: In loam, rather dense forest, Tarapoto, *Williams 6628*. Without locality, *Ruiz & Pavón*, type. Morales near Tarapoto, *Williams 5713* (det. Harms). Juanjuí, *Klug 3769* (det. Standley). Zepelacio, *Klug 3727* (det. Standley; cf. *T. maynasiana*). "Lechuza-caspi" (Williams).

Trichilia Poeppigii C. DC. Monogr. Phan. 1: 685. 1878.

Younger branchlets dark rubescent, finally clay-colored, glabrous except the flowers; petioles 2 cm. long, narrowly winged, canaliculate above; leaves about 3 dm. long; leaflets alternate, petiolulate, 3 pairs, elliptic-oblong or lanceolate-oblong, the upper 17 cm. long, 6 cm. wide, equal, the lower 2 much smaller, elliptic, all equal and acute at base, acutely cuspidate, rigid, opaque, with about 16 alternate lateral nerves; panicles much shorter than leaves, simply branched, elongate, branchlets peduncled, corymbosely cymuliferous at tip, the bracts decurrent; pedicels very short; calyx cupulate, entire, puberulent without; petals 4, sericeous without, about 3 mm. long; staminal tube glabrous, acutely denticulate; ovary yellowish-hirsute, the short style 3-denticulate; capsule ellipsoid, rufescent, glabrous, 2.5 cm. long.—In the Berlin Poeppig specimens the petals not sericeous; possibly that was a depauperate specimen of *T. maynasiana* or *T. taropotoana*, with poorly developed inflorescence? Harms separates the species from *T. alternans* and *T. maynasiana* by the lowest leaflets of each leaf much smaller than the upper; in this respect like *T. iquitosensis* with inflorescence as long as leaves, a character shared by the two species of C. DC. However, specimens determined by Harms himself suggest that all these differences are ones of degree and that only one species is concerned, at least as to *T. Poeppigii* and *T. iquitosensis*. Both Poeppig collections are cited by C. DC. for both his species! F.M. Neg. 14474.

Loreto: Maynas, Yurimaguas, *Poeppig 2407*, type with *2407D*, both referred also by C. DC., 700, to his *T. alternans!* Brazil.

Trichilia Riedelii C. DC. in Mart. Fl. Bras. 11, pt. 1: 202. 1878; 650. *Portesia echinocarpa* De Vriese in Nederl. Kruidk. Arch. 1: 251. 1848? fide C. DC. *T. echinocarpa* De Vriese ex Walp. Ann. Bot. 2: 227. 1851.

Becoming a tall tree, the younger branchlets, petioles and leaves beneath (typically) somewhat finely hirtellous, the former sparsely lenticellate-asperulous; petioles nearly 3 cm. long, complanate above; leaves at least 2 dm. long, with 2 pairs (typically) of opposite or

alternate shortly petiolulate rather firm pellucid and sparsely pellucid-punctulate oblong-elliptic leaflets, acute at base, acutely cuspidate, the terminal 12 cm. long, 5 cm. wide; secondary nerves alternate, ascending, about 10 on each side; panicles scarcely half as long as the petioles, dense-flowered, 2–3-fid to base, the 1-flowered cymules bibracteolate, pedicellate, the subsessile flowers soon caducous; calyx densely hirtellous, typically (not in Peru) deeply 4-lobed; petals 4, membranous, closely puberulent, oblong-elliptic, 5 mm. long; filaments bidenticulate at apex, filiform tube-teeth little longer than the sparsely hirtellous elliptic anthers; ovary ovoid, villous, about as long as the style, this deeply included; stigma minute, 3-lobed; capsule 1-seeded, tuberculate and rigid-hispid.—Williams found it as a small tree at most 12 meters tall with open crown, pinkish or reddish-brown, rather smooth bark, the inner bark separating into long thin flakes. Harms has questioned the identity of the Brazilian type and the plant of Peru; he followed C. DC., however, in distinguishing the species from *T. flava* by the panicles being much shorter than leaf-petiole, a doubtful character. Near if distinct are *T. montana* HBK., 654, Ecuador, Colombia, and *T. macrophylla* Benth., 652, Amazonian; apparently the capsules of the former are more tubercled, the leaves of the latter much larger, panicles shorter, as to types. Determinations by Harms except as noted. F.M. Negs. 14477; 23091 (Spruce).

San Martín: Near Tarapoto, *Spruce 4421* (det. C. DC.); *Williams 6536*. Río Mayo, *Williams 6197*.—Loreto: In dense flood-free forests, Puerto Arturo, *Williams 5149*. Caballo-Cocha, *Williams 2368* (could be *T. flava*, Harms). Balsapuerto, *Klug 2966* (det. Standley). Florida, *Klug 2328* (det. Standley). Brazil. "Lluillocaspi," "uchu-mullaca" (Williams).

Trichilia Ruiziana C. DC. Monogr. Phan. 1: 702. 1878.

Completely glabrous except the ovary, this merely pulverulent; branchlets pale-lenticellate; rachis with petiole scarcely 2 dm. long, terete, the leaves about 22 cm. long; leaflets 3 pairs, alternate, the upper a little obovate-lanceolate, acute at base, about 15 cm. long, a third as wide, lower lanceolate-elliptic, all obtusish cuspidate, subcoriaceous, opaque, said to be pellucid-punctate, the alternate lateral nerves 16–20, scarcely prominent beneath; panicles axillary and subterminal, equaling the leaves, elongate, shortly branched, cymules very shortly pedicelled, 1–3-flowered, crowded at the apex of the branches, the flowers subsessile; calyx cupulate, acutely 5-repand-

dentate; petals 5, oblong-deltoid, saccate-inflexed at tip, about 3 mm. long; staminal tube acutely 8-denticulate; anthers ovate-lanceolate; ovary by abortion 2-celled, cells 2-ovuled, the style as long, glabrous with discoid stigma.—Often about 25 meters high with flat crown, compressed trunk, the reddish-brown bark scaly and with gray patches, thick, the inner coarsely flaky (Williams). F.M. Neg. 14479.

San Martín: Juanjuí, *Klug 3896* (det. Standley).—Loreto: In flood-free forest, lower Huallaga, *Williams 4891* (det. Harms). Without locality, *Ruiz & Pavón,* type. "Uchu-mullaca" (Williams), "sapote-yaco" (Williams).

Trichilia sexanthera C. DC. Notizbl. Bot. Gart. Berlin 6: 501. 1917.

Branchlets elenticellate, glabrous, or the younger minutely puberulent; leaves alternate, imparipinnate, rachises and petioles terete, 2.5 cm. long, petiolules to 6 mm. long; leaflets alternate, in type 2 pairs (sometimes more?), the terminal and upper elliptic-lanceolate, acute at base, acutely acuminate, the terminal to 13 cm. long, 5 cm. wide, lateral about 10 cm. long, 3.5 cm. wide, lower more elliptic, to 4.5 cm. long, 3.5 cm. wide, all in drying firm-membranous, pellucid-punctate, punctae mostly oblong, nerves slender, 12–14, glabrous or sometimes sparsely pilose; panicles axillary, glabrous, peduncled, pyramidately branched, to 17 cm. long, lower branches to 4 cm. long; flowers yellowish-greenish, pedicels 1 mm. long; calyx cupulate, 0.5 mm. long, minutely puberulent without, 4-dentate, the teeth rounded; petals 4, valvate, ovate, truncate at base, acute, 2 mm. long, half as wide, pulverulent beneath; staminal tube glabrous, acutely dentate, anthers 6, subsessile, ovate; ovary hirsute, 3-celled, cells 2-ovuled, style glabrous, stigma minute, orbicular.—Section *Moschoxylum.* Ule collections from shrubs 2–6 meters high, Tessmann from trees 18–20 meters high, trunks 15 cm. in diameter. F.M. Neg. 14484.

San Martín: Tarapoto, *Ule 6593b,* type; also *6593* and *6593c.* Juanjuí, *Klug 4158* (det. Standley, *T. maynasiana!*).—Loreto: Mouth of Santiago, (*Tessmann 3934; 4498; 3964,* all det. Harms). Boquerón Padre Abad, *Woytkowski 34476?* Brazil.

Trichilia singularis C. DC. in Mart. Fl. Bras. 11, pt. 1: 217. 1878; 703.

Unique (for Peru) in the genus by the simple leaves and thus aberrant also for the family; glabrous except the panicles, the

clay-colored branchlets dotted with minute pale lenticels; petioles and panicles about 3 cm. long; leaves oblong-lanceolate, acute at both ends, about (12) 21 cm. long, (4.5) 8 cm. wide, rather firm, opaque, epunctate, with about 25 alternate or subalternate nerves; panicles simple or branched from the base, sparsely sericeous pubescent, floriferous at apex; calyx acutely 5-dentate, pubescent without as the 5 oblong acutely acuminate petals, these 2 mm. long; staminal tube glabrous, acutely dentate, the teeth bidentate; ovary sessile, 3-celled, hirsute, the much shorter style glabrous, stigma minute.—Shrub to 6 meters tall, the dark brown or almost black bark with many small interwebbing ridges; fairly common, forming undergrowth in dense forest (Williams). *Klug 3828* was distributed as a new species named for Harms but apparently unpublished; it has much shorter panicles and may be distinct.

San Martín: Juanjuí, *Klug 3828*.—Loreto: At the edge of the lake, Yarina Cocha, *Tessmann 3381*. La Victoria, *Williams 3114; 3123*. Amazonian Brazil.

Trichilia solitudinis Harms, Notizbl. Bot. Gart. Berlin 10: 247. 1928.

Branchlets brown-villous as also to greater or less degree petioles, leaf-nerves beneath and panicles; leaf-rachises to 25 cm. long, petiolules 3–7 mm. long; leaflets alternate, to 11, oblong or more or less obovate, acute or obtusish at base, rounded or obtuse (perhaps acuminate?), the lowest 4–5 cm. long, the larger uppermost 15–22 cm. long, 8–10 cm. wide, chartaceous, glabrous above except midnerve, puberulent or glabrate beneath except the many lateral nerves; panicles axillary, peduncles to 1 dm. long, rachis nearly as long, pedicels very short; calyx patelliform, subentire or minutely denticulate, nearly 3 mm. across, petals 4 or 5, ovate-lanceolate, acute, valvate, connate nearly to the middle, or cohering, about 6 mm. long, densely villosulous without; staminal tube glabrous or nearly, pilose within at tip, anthers 8–10, unequal; ovary villous, sessile, style glabrous, stigma capitate.—Type from a 30 meter tree with trunk 5 dm. in diameter, flowers bright yellow; distinctive among the species section *Moschoxylum* (Harms). There is a specimen from Florida, *Klug 2309*, from a 4 meter tree, the flowers "flesh red" in panicles only 3 cm. long, leaves small but it is young and maybe belongs here; it was distributed as *T. flava* C. DC.

Loreto: Flood-free wood near Soledad, lower Itaya, *Tessmann 5160*, type.

Trichilia tarapotoana C. DC. Notizbl. Bot. Gart. Berlin 6: 502. 1917.

Branchlets lenticellate, the younger minutely and sparsely puberulent; leaves alternate, imparipinnate, rachises and petioles about 12 cm. long, terete, petiolules to 7 mm. long; leaflets elliptic-lanceolate, acute at base, acutely acuminate, the terminal to 15 cm. long, a third as broad, the subsequent, opposite or alternate 12 cm. long, a third as wide, the lower pair opposite, 6.5 cm. long, 2.5 cm. wide, all firm, opaque, glabrous above, hirtellous beneath, especially on the midnerve; panicles axillary, glabrous, 10–12 cm. long, the branches 1.5 cm. long; pedicels about 1 mm. long; flowers yellowish-white, calyx in type entire, patelliform, minutely and sparsely pulverulent without as the 4 firm reddish lanceolate acute petals, these 3 mm. long, half as wide; staminal tube hirsute, the teeth filiform, equaling the 8 subsessile glabrous subacute anthers; ovary hirsute, 3-celled, cells 2-ovuled, style glabrous, shorter, stigma subglobose, entire.—Section *Moschoxylum*. A shrub as to type. Perhaps not specifically distinct from *T. maynasiana* unless by larger flowers, hirsute ovary; some of the material from Tarapoto referred to *T. maynasiana* may rather belong here. There are several related Brazilian species: cf. Harms, Pflanzenfam. ed. 2. 19bI: 115. 1940.

San Martín: Tarapoto at Juan Guerra, *Ule 6618*, type.

Trichilia tocacheana C. DC. Monogr. Phan. 1: 701. 1878. *Moschoxylum pentandrum* Poepp. in Poepp. & Endl. Nov. Gen. & Sp. 3: 39. 1845, not *T. pentandra* Blanco, Fl. Filipin. 1837.

Tall shrub or tree, glabrous except for some fine puberulence on the leaf nerves beneath, or these glabrous, and on the calyces and petals without; leaves about 16 cm. long, the rachis and petiole sulcate above; leaflets 3–4 pairs, alternate, oblong-elliptic, equally acute at base, shortly cuspidate, 7.5 cm. long, 2.5 cm. wide, rigid, opaque, epunctate, the alternate lateral nerves about 16, not at all prominent beneath; panicles often unequally trifid at base, the middle branch about as long as the leaves; cymules as flowers pedicelled, 1–3-flowered, the bractlets sometimes coalescent with branchlets; calyx acutely 5-dentate; petals 5, connate at base, about 3 mm. long, simulating a 3-parted gamopetalous corolla; staminal tube 5-laciniate (always?), the divisions bidenticulate, villous within; anthers 8–10, acute; ovary villous, sessile, the shorter style with cylindric 3-dentate stigma.—To 25, even 50 meters, crown spreading, trunk with strong, medium size or tall buttresses, bark thin, grayish-brown, rather

smooth; flowers creamy white, anthers brown; fruit ovoid, yellowish-brown, seeds lustrous, red; common, dense flood-free forests (Williams). Timber is used for general carpentry. The nearly glabrous fruits of the Williams collections are 15–18 mm. long, about 7 mm. thick. *Killip & Smith 29095* has glabrous stamen tube, not "5-laciniate," the anthers sessile between minute dentations; the early repand-subdenticulate calyces are soon cleft irregularly, and this number, if I may judge from comparison with part of the type, seems to be correctly named. F.M. Neg. 14497.

Huánuco: In woods, mission Tocache, *Poeppig 1956*, type.—Loreto: Mouth of the Santiago, *Tessmann 4132*. Mouth of the Apaga, *Tessmann 3840*. Lower Huallaga, *Williams 4005; 4128; 5354* (all det. Harms). Yurimaguas, *Killip & Smith 29095* (det. Harms). "Lupuna," "rifari."

Trichilia tomentosa HBK. Nov. Gen. & Sp. 5: 215. 1822; 666.

Younger branchlets, petioles, leaf-rachises and leaflets beneath more or less canescent with a fine puberulent tomentum; leaves crowded at the branchlet tips, about 14 cm. long, petioles complanate above toward base, 3.5 cm. long; leaflets opposite, subsessile, 12–15 pairs, oblong-elliptic, subacute at base, acutely subacuminate, to 14 cm. long, 1.5 cm. wide, firm, opaque, drying rubescent above; panicles scarcely half as long as the leaves, the lower branches hardly 1 cm. long; calyx puberulent, deeply 5-dentate, the ovate teeth acute; petals membranous, obovate-oblong, subacute, pubescent without; staminal tube glabrous, the bidentate divisions villous as the ovary, this as long as cylindric disk; anthers hirtellous; style glabrous, equaled by the large broadly cylindric stigma.—Shrub-tree, the flowers pale green (Weberbauer). Species marked by the branchlets roughened by the fallen leaf-bases, small leaflets rather tomentose beneath and crowded at ends of branchlets, short panicles (Harms).

Cajamarca(?): Between "Cotumasey et Truxillo," *Bonpland*, type. Between Contumaza and Magdalena, 2,600 meters, *Weberbauer 7222* (det. Harms). Ecuador?

Trichilia Ulei C. DC. Ann. Cons. Jard. Bot. Genève 10: 164. 1907.

Tree or shrub 4–15 meters high, the younger branchlets puberulent with a few concolored lenticels; leaves alternate, to 3.5 dm. long, the leaflets alternate, subsessile, 5–6 on both sides, suboblong,

equilateral at base, subacute and shortly acuminate, the upper nearly 14.5 cm. long, 3.5 cm. wide, the spreading nerves 18–20 on each side, glabrous except the midnerves above minutely puberulent as the rachises and petioles, these 4 cm. long, sulcate above, grooved; panicles densely puberulent with the long peduncles nearly equaling the leaves, rather remotely and shortly branched, the white flowers ovate in bud, shortly pedicelled; calyx cupulate, velutinous-puberulent, 5-crenate with rounded teeth; petals subcoriaceous, densely puberulent without, oblong, acuminate, connate below, 5 mm. long, 1.5 mm. wide; staminal tube puberulent both sides, the subovate-oblong glabrous anthers little shorter than its filiform teeth; ovary densely hirsute, the cells 2-ovuled; style glabrous with subglobose stigma.—Section *Moschoxylum* C. DC. *Williams 6828* has young oblong-ovoid densely puberulent capsules 2 cm. long, 7 mm. thick. Bark pinkish to brown with gray patches; fruit ovoid, gray-brown; the hard timber used for general construction (Williams). F.M. Neg. 14500.

San Martín: Tarapoto, *Ule 6612*, type. Rumisapa, *Williams 6828* (det. Harms).

Trichilia validinervia Harms, Notizbl. Bot. Gart. Berlin 11: 785. 1933.

Branchlets, especially the younger, more or less villosulous as the petioles, leaf-rachises and leaflets particularly on the nerves beneath; petioles 3–7 cm. long, leaf-rachises slightly applanate-dilated; leaflets often 2 pairs or 5, the lateral opposite, 2–5 mm. petiolulate, the terminal often to 12 mm. petiolulate, the lateral internodes almost none or to 4 cm. long, the blades obovate-oblong to lanceolate-oblong, the lateral often obliquely obtuse or acute at base, terminal cuneate-narrowed, all shortly acuminate, subentire or broadly crenulate-undulate, chartaceous, glabrous above unless midnerve, 4.5–18 cm. long, 1.5–10 cm. wide, the midnerve and the 10–15 lateral nerves prominent beneath; panicles axillary, ample, more or less villosulous, 1–1.5 dm. long or longer; calyx remains acutely 5-lobed nearly to base; capsules subsessile, narrowly ovoid, 10–12 mm. long, shortly appressed brown-villous, the usually solitary seed 8 mm. long, lustrous, dark brown, the fragile aril red-brown.—Like *T. peruviana* C. DC. but pubescent and the leaf-nervation strong (Harms). In the flowering material referred here with doubt the leaflets are softly villous beneath, the petals 5, 1.5–2 mm. long, glabrous or nearly as the ovary. F.M. Neg. 29478.

Huánuco: Puente de Pillao, *Ruiz (& Pavón)*, type, in 1787.—Loreto: Slender shrub or tree, 3–5 meters, Puerto Arturo, *Killip & Smith 27761*. Balsapuerto, *Killip & Smith 28424; 28360*.

Trichilia Weberbaueri C. DC. Repert. Sp. Nov. 19: 55. 1923.

Hirsute or pilose-hirsute including the panicles, the leaves least densely so above, these imparipinnate, alternate, the rachises and petioles 3.5 cm. long, petiolules 5 mm. long; leaflets 3 pairs, opposite, oblong-obovate or the lower obovate, all cuneate at base, rounded at apex, the former 7.5 cm. long, 2.8 cm. wide, the lower 3–3.5 cm. long, about 2 cm. wide, pale and membranous in drying, the pellucid punctae oblong; panicles axillary, as long as the leaves, the floriferous branches about 3 cm. long, cymules 2–3-flowered, pedicels 1 mm. long; calyx 1 mm. long, glabrous within, the 5 ovate teeth acute; petals 5, oblong-elliptic, 2.5 (5, probably by error) mm. long, 1 mm. wide, hirsute below, pulverulent above except for glabrous base and margins; staminal tube denticulate, pilose at tip, stamens 10, glabrous, ovary glabrous, 3-celled, the longer style glabrous, the globose stigma 3-denticulate.—Type an 8 meter shrub, the branchlets elenticellate, yellowish-hirsute, the flowers greenish. In the specimen seen the petals are about 2.5 mm. long but described as 5 mm. long.

Piura: Below Frias, Prov. Ayavaca, 700 meters, *Weberbauer 6422*, type.

Trichilia Williamsii Harms, Notizbl. Bot. Gart. Berlin 11: 387. 1932.

Glabrous except the puberulent panicles including the petals without; leaf-rachises with petiole nearly 15 cm. long, applanate and narrowly margined, with 5–7 alternate short (5–7 mm.) petiolulate, chartaceous narrowly oblong or oblanceolate-oblong leaflets 10–14 cm. long, 4–6 cm. wide, the basal often smaller and wider, all acute or obtuse at base, acuminate; panicles 7–9 cm. long, branchlets 1.5 cm. long or perhaps longer; calyx patelliform, subentire or irregularly incised, minute; petals 5, high-connate, acute, minutely nearly sparsely puberulent, about 4 mm. long; staminal tube glabrous, shortly denticulate with 10 anthers at margin; ovary subsessile, villosulous.—*T. Poeppigii* C. DC. has smaller flowers, especially calyx, 4 petals, 6 stamens; also the leaves are smaller (Harms). To 15 meters or taller, bark pale green to brown; flowers white. Timber used for beams.

Loreto: Flood-free area, Puerto Arturo, Río Huallaga, *Williams 5284*, type; also *5353*.

6. GUAREA (Allem.) L.

Ruagea Karst. Fl. Columb. 2: 51. *pl. 126*. 1862–69.

Tree or shrubs with usually abruptly pinnate leaves (simple in one Peruvian species) of entire rarely pellucid-punctate or -lineate leaflets and paniculate racemiform or spiciform inflorescences that are axillary or borne on leafless branchlets or from the trunks. Flowers hermaphrodite with 3–5-dentate cupulate calyx becoming irregularly divided, or with as many sepals that are more or less connate, rarely free, and 4–5 free erect oblong petals. Stamens 8–10, connate into entire or dentate tube, the anthers sessile. Disk stipitiform. Ovary (3) 4–5 (7–12)-celled, 1–2 ovules in each cell. Stigma disciform or short-cylindric. Capsule coriaceous or ligneous, loculicidally 3–5-valved, valves 2-layered, the brown red seeds only pseudoarillate.—The name is modified from a native one of Cuba, "Guara."

Harms, Notizbl. Bot. Gart. Berlin 9: 427. 1925, argued for the retention of *Ruagea* Karst. treated by C. DC. l.c. 577, as a section of *Guarea*. He took as basic the free sepals and suggested that this character may be associated with imparipinnate leaves. However the leaves vary in this respect in the family elsewhere as in *Trichilia* and in the same tribe, as does the calyx in degree of sepal union (in *Trichilia* as here sometimes sepals free). Furthermore Harms in 1928 had to propose *R. microsepala* l.c. 10: 242, with "sepals free, or nearly free or rarely connate to the middle." It is true that the maintenance of *Ruagea* is in accordance with the taxonomy of the Dysoxylinae of Harms and others, a segregation, however, in view of the variation of the key-characters that conceals the close relationship of the species groups; *Cabralea* itself is only for convenience separable from *Dysoxylum*, sect. *Didymocheton* (Blume) C. DC. Expediency apparently demands the retention of the development of the discal tube as in *Cabralea* for taxonomic purposes in spite of the variation of it within *Trichilia*. There seems, however, not even convenience to be gained by stressing the variation in sepal character as adoption of *Ruagea* would. As in the anomalous situation in the *Ericaceae*, segregation is concealing here the close relationship of these widely distributed groups.

G. punctata, described from fruiting specimens, is omitted from the following key based for convenience on flowers. Nearly all

these trees described as species are imperfectly known; as observed by Harms the number of flower-parts is not constant and the position of the inflorescence may prove to be various in the same species; observations on this must be made by collectors!

Cocillana Bark, a pharmaceutical product, is obtained from *G. trichilioides*, or *G. Rusbyi* (Britton) Rusby, the same, fide C. DC.; Rusby, Coblentz & Wilcox, Bull. Pharmacy 7: 350. 1893 or Bot. Centralbl. 60: 214. 1894; see also Rusby, Jungle Memories 150. 1933 and Harms for further citations.

Sepals free or nearly free unless *G. microsepala;* petals glabrous or nearly, 4–7 mm. long (8 mm., *G. microsepala*).

Leaflets 5–15 pairs, usually clearly more than twice as long as wide.

Leaflets oblong-lanceolate, acute at base, acuminate.

Panicles much shorter than the leaves; ovary subsessile; stigma peltate..... *Ruagea Augusti, G. Weberbaueri.*

Panicles exceeding the leaves; ovary stiped; stigma discoid. *G. Tessmannii.*

Leaflets oblong-elliptic, rounded to barely acute at base, shortly or obscurely acuminate.

Leaflets hirsutulous; petals 5 mm. long.....*G. pilanthera.*

Leaflets glabrous; petals 7 mm. long.....*G. subviridiflora.*

Leaflets 2–4 pairs, about twice longer than broad.

Petals 5, 5–6 mm. long, glabrous as ovary.

Plants glabrous except the puberulent sepals....*G. Jelskiana.*

Plants hirsutulous-villous except leaflets above and petals. *G. Raimondii.*

Petals 4, 8 mm. long, pubescent as ovary.....*G. microsepala.*

Sepals more or less connate; petals puberulent to villous except *G. filiformis, G. Klugii* and, except in first group of 12 species-names, longer than 8 mm. or at least as long.

Petals 4–6 (–7) mm. long, the flowers usually 4-merous, the calyx small, 1–2 (–3) mm. long, about as broad (*G. fissicalyx* with irregular larger calyx might be sought here as there is apparently a short-flowered form).

Panicles subsimple, glabrous or glabrate, erect or more or less pendent, in any case typically longer than petioles; petals 4–7 (–8) mm. long; *G. aligera, G. pterorhachis,* leaf rachis winged, key here.

Petals and ovary glabrous, or former pulverulent in *G. macrobotrys.*

Petals glabrous, as to types.

Rachis slender; petals 4 mm. long.....*G. filiformis.*

Rachis rather stout; petals about 7 mm. long..*G. Klugii.*

Petals pulverulent in type.....*G. macrobotrys.*

Petals and ovary pubescent; cf. *G. macrobotrys*, probably basic species for the following doubtful forms except *G. Ulei*, *G. trichilioides.*

Panicles axillary, elongating; leaflets glabrous or nearly.

Leaflets about 4 pairs or fewer; petals 4, rarely nearly 8 mm. long.

Petals about 4 or 5 mm. long.
G. acreana, G. franciscoana, G. maynasiana.

Petals 7 to nearly 8 mm. long..*G. Eggersii, G. odorata.*

Leaflets usually more than 4 pairs; petals 5–7 mm. long.
forms of *G. trichilioides.*

Panicles borne on the older branches; leaflets softly pubescent beneath.....*G. Ulei.*

Panicles somewhat hirsute except *G. trichilioides; G. simplicifolia* short or often pyramidal especially if elongating; petals 6–7 mm. long.

Leaflets 6–10, rarely only 4, pairs; panicles long-pyramidal, axillary on leafy branchlets, glabrate; ovary sericeous.
G. leticiana, G. trichilioides.

Leaflets 1–4 (5) pairs; ovary, except *G. Huberi*, glabrous; panicles hirsute, short.

Calyx 4-dentate; leaflets 4–5 pairs.

Leaflets narrowly oblong; calyx acutely dentate.
G. purpurea.

Leaflets broadly elliptic; calyx lobulate.....*G. Huberi.*

Calyx subentire; leaflets 1–3 pairs.....*G. subsetulosa.*

Leaflets reduced to 1; ovary glabrous.....*G. simplicifolia.*

Petals usually 8–14 mm. long; calyx often 3 mm. long and broad or larger, the flowers 4- or 5-merous, or more; if shorter than 8 mm. apparently always 5-merous (cf. *G. odorata*). Few specimens conform entirely to type characters upon which key is based, following Harms.

Panicles pseudosimple, the lower branches at anthesis little if any longer than those above (cf. *G. Borisii*).

Panicles axillary or below the branchlet leaves or on branchlets; petals 4 except *G. fissicalyx* with irregularly cleft calyx.

Calyx 4-dentate; petals 1 cm. long; panicles often short.

Leaflets 5–10 pairs, coriaceous, said to be pubescent on nerves beneath; ovary 7-celled, sericeous. *G. grandifolia.*

Leaflets 2–6 pairs, glabrous; ovary glabrous; panicles often a few cm. long.....*G. depauperata.*

Calyx soon deeply or irregularly lobed; panicles to 4 dm. long; ovary pilose.....*G. fissicalyx.*

Panicles on the older branches or trunks (always?); ovary pubescent, 4–5–6-celled, or 11–12-celled; calyx 3–6-dentate, sometimes irregularly but not deeply as *G. fissicalyx.*

Lateral nerves about 15, typically finely villous or "velvety puberulent beneath" or Peruvian specimens glabrate; calyx 3–5-dentate; panicles short.*G. Ulei, G. trunciflora.*

Lateral nerves "15–18 or more," glabrous or nearly, many about 2 cm. distant each side puberulent midnerve; petals 6 or 7, 14–15 mm. long; ovary 11–12-celled; panicles elongate.....*G. carapoides.*

Lateral nerves (type, *G. Casimiriana*) to about 40, many 1–1.5 cm. distant, typically sparsely hirsutulous or villous; petals and ovary cells 3, 4 or 5 the former (6) 12–13 mm. long.....*G. Casimiriana, G. eriorhachis.*

Panicles pyramidal, open, the lower branches developed but the central axis often elongate; petals 4–5.

Ovary glabrous; petals 8–12 mm. long. *G. oblongiflora, G. Kunthiana.*

Ovary pilose; petals 14–16 mm. long.....*G. Guentheri.*

Ovary hirsute; petals about 8 mm. long.....*G. leticiana.*

Guarea acreana C. DC. Notizbl. Bot. Gart. Berlin 6: 498. 1917.

Glabrous except the flowers, the branchlets lenticellate; leaves alternate, moderately petioled, the rachis rough with 4–5 pairs of petiolulate (to 4 mm.) opposite, membranous pellucid-punctate

acute-based obtusely acuminate leaflets, the upper ones oblong-elliptic, 15 cm. long or longer, 5 cm. wide, the lower more elliptic, about half as long or less, 4 cm. wide, the ascending secondary nerves 8; racemes subsessile, simple, little shorter than the leaves, spicately cymulose, about 18 cm. long, the cymules 1–2-flowered with ovate bracts that are hirsute beneath; buds oblong, subsessile; flowers roseate-purple with 4-dentate calyx, the teeth rounded, puberulent only without; petals 4, oblong, acute, appressed hirsute without, at least 4 mm. (young in type) long, 1.5 mm. wide; staminal tube entire, glabrous, with 8 oblong anthers affixed below the middle; ovary hirsute, 4-celled, the cells 2-ovuled, style pilose below, stigma cylindric.—Tree 20–30 meters high. Cf. *G. macrobotrys* and certainly near *G. odorata* C. DC. (cf. below) and the Bolivian *G. pendulispica* C. DC. F. M. Neg. 14388.

Río Acre: Seringal San Francisco, *Ule 9513*, type.

Guarea aligera Harms, Notizbl. Bot. Gart. Berlin 10: 181. 1927.

Glabrous except the flowers; branchlets stout; leaves pinnate, rachises with petioles 10–13 cm. long or in larger leaves 4–5 dm. long, the internodes as the petioles more or less broadly winged; leaflets 3–5 pairs, mostly oblong-lanceolate, often narrowed at base on one side or subcordate to auriculate, apex somewhat acuminate, 15–30 cm. long, 7–10 cm. wide, chartaceous, lateral nerves 7–14 rather prominent beneath; panicles ample, in type 2–4.5 dm. long, only ultimate branchlets puberulent; calyx broadly 4-lobed, obtusish, pulverulent, 2.5 mm. broad; petals 4, oblong-lingulate, obtusish, sparsely pulverulent, 4–4.5 mm. long; staminal tube obviously ampliate at tip, subtruncate, glabrous, 3–3.5 mm. high, anthers 8, truncate, sessile below the margin, included; ovary stiped, glabrous as also the style, the stigma capitate-peltate, a little exserted.—Resembles *G. pterorhachis* Harms but with smaller calyx, stouter branchlets, more leaflets (Harms). As more material accumulates the apparent differences become doubtful. Tree 10–15 meters high, trunk 2–3 dm. thick, flowers fragrant with roseate calyx and petals or latter yellowish (Tessmann); bark light brown with long narrow scales (Williams). F.M. Neg. 14389.

San Martín: Pongo de Cainarachi, *Klug 2699* (det. Standley). —Loreto: Flood-free woods, mouth of the Santiago, *Tessmann 4389*, type. Puerto Meléndez, *Tessmann 4873*. Puerto Arturo, *Williams 5333* (det. Harms). Florida, mouth of Río Zubineta, *Klug 2299* (det. Standley).

Ruagea Augusti Harms, Notizbl. Bot. Gart. Berlin 9: 428. 1925. *Cabralea Weberbaueri* Harms, Repert. Sp. Nov. 18: 447. 1922, not *G. Weberbaueri* C. DC., 1907.

Glabrous except the puberulent calyx and staminal tube within; leaf rachises with petioles 1.5–2.5 dm. long with 10–13 lanceolate or oblong-lanceolate, often oblique leaflets about 8–11 cm. long, 2–3 cm. wide, more or less narrowed to short petiolule, obtusely acuminulate, minutely and densely puncticulate beneath; panicles pyramidal, many flowered, 2–3 dm. long with peduncle, the lower branches 3–10 cm. long; sepals 5, suborbicular, the 5 oblongish petals to 6 mm. long, 2–2.5 mm. wide; staminal tube 4–5 mm. long, the broad obtuse short teeth bifid, the 10 anthers sessile below the margin; style glabrous, ovary 3-celled, sessile in subpatelliform disk (urceolate disk lacking), the stigma peltate.—Differs from *G. Trianae* C. DC. in the size of panicles, longer petals; from *G. Weberbaueri* C. DC. in the fewer leaflets with fewer lateral nerves (Harms); characters which appear variable but stamen tube may distinguish the forms. Type a tree 6 meters high with greenish flowers.

Libertad: Valleys of the Mixiollo, Prov. Pataz, 1,900 meters, *Weberbauer 7069*, type.

Guarea Borisii Harms, Notizbl. Bot. Gart. Berlin 13: 503. 1937.

Type imperfect but from a tree to 30 meters high, the stout pinnate leaf nearly 3 dm. long with very thick densely brown-villous rachis and probably with 4 or more pairs of opposite shortly petiolulate ovate or oblong-ovate leaflets, 15–22 cm. long, 9–12 cm. wide, shortly acuminulate, broadly rounded or cordulate at base, chartaceous, glabrescent above, laxly hirsutulous beneath or villous on the midnerve and the 12 or so rather prominent lateral ones; panicles axillary, peduncled, narrow, the lower branchlets many-flowered; buds with calyx subglobose, shortly denticulate at tip, densely hirsute-villous.—The panicle is about 2 dm. long, certainly shorter than the leaf; resembles *G. Sprucei* C. DC. but leaf reticulation beneath deep and the lateral nerves somewhat closer (Harms). The younger leaves are velvety villous beneath, the older glabrate but probably heavy-coriaceous before drying, suggesting Moraceae. The tree seems to be much like *G. Sprucei* C. DC., 569, of Brazil.

Río Acre: Basin of Río Purús, near mouth of Río Macauhán, *Krukoff 5319*, type; also *5387* (both distrib. as *G. purusana* C. DC., ex char.).

Guarea carapoides Harms, Notizbl. Bot. Gart. Berlin 10: 245. 1928.

Branchlets rather stout, densely puberulent as the younger petioles, leaf-rachises and the long, very narrow panicles borne directly on them or on the trunk; rachises including petioles 4 or 5 dm. long or longer, with 4–5 pairs, perhaps more, of lanceolate or oblanceolate 8–13 mm. petiolulate leaflets, 2–4.5 dm. long, 6–12 cm. wide, or larger, acuminate, the narrow base obtuse or acute, papyraceous or chartaceous, glabrous or glabrescent except the puberulent midnerve beneath, this there, as the many (15–18 or more) nerves, rather prominent; panicles to 3 dm. long, laxly branched, the branches to 4 cm. long, pedicels 4–7 mm. long; calyx puberulent, somewhat irregularly 4–6-lobed, 5–6 mm. long; petals 6, lanceolate, acute, appressed subsericeous without, 14–15 mm. long; staminal tube truncate, glabrous or pulverulent, to 9 mm. high; anthers 11–12, muticous, included; ovary sessile, appressed pilose as the short style, stigma discoid, the ovary cells 11–12, probably uniovulate.—The calyx even before anthesis is nearly 1 cm. across. Type 12 meters high, the upper inflorescence dark red, petals yellowish-white, rose tinted. F.M. Neg. 18195.

Loreto: Flood-free wood, mouth of the Santiago, *Tessmann 4376*, type.

Guarea Casimiriana Harms, Pflanzenfam. ed. 2. 19bI: 133. 1940. *G. Poeppigii* C. DC. Monogr. Phan. 1: 568. 1878, not Tr. & Pl. 1872. *Carapa cauliflora* Poepp. in Poepp. & Endl. Nov. Gen. & Sp. 3: 39. 1845, not *G. cauliflora* (Blume) Spreng. 1827.

Type a low tree, the flowers borne in simple yellowish villous panicles directly and either solitary or fascicled from the branches; short petioles lightly villous as the leaflets beneath on the spreading-ascending alternate or subalternate nerves, these about 40 on each side; leaflets 4 dm. long or longer, about a fourth as wide, in type 3 pairs, firm-chartaceous, nearly opaque, subobovate-oblong, acute at base or the upper rounded, all shortly and acutish acuminate, glabrous above; flowers sessile or subsessile; calyx 5 (fide Harms, 4)-dentate the often bidentate sometimes unequal segments pubescent; petals densely appressed yellowish hirsute, 6 or, fide Harms, to 12 mm. long, subcoriaceous, oblong, acutish; tube subovate-cylindric, entire, contracted at two-thirds the length, coriaceous; anthers 10 (or 8, Harms), oblong, 2 mm. long; ovary ovate, as long as gynophore, densely yellowish hirsute, 3–5-celled, the cells 4-ovuled (2, fide

Harms), the style as long, apically glabrous.—Panicles in type 1.5 dm. long or longer; probably should be drawn to include the related "species." Type had trunk about 1.5 dm. in diameter with rugose bark. F.M. Neg. 32405.

Loreto: Maynas, *Poeppig 2261*, type. Between Yurimaguas and Balsapuerto, *Killip & Smith 28117*.

Guarea depauperata Harms, Notizbl. Bot. Gart. Berlin 10: 243. 1928.

Glabrous or essentially except the long subsimple minutely puberulent panicles; branchlets slender, cinereous or pale; leaves with 2–6 or more pairs of opposite petiolulate oblong or lanceolate-oblong leaflets, narrowed to base, more or less acuminate, 5–17 cm. long, 3–8 cm. wide, papyraceous, a little paler beneath; panicles axillary or below the branchlet leaves, 2–11 cm. long, the puberulent pedicels 2–3 mm. long; calyx puberulent, 3–4 mm. long, 4-lobed, lobes minutely apiculate; petals 4, ligulate, acute, appressed pubescent without, 10 mm. long, 3 mm. wide; staminal tube a little puberulent at base and tip, subtruncate; anthers 8; ovary stiped, glabrous as style, stigma discoid, obconic.—Detached fruit *Killip & Smith 29090* minutely verruculose, globose, 2 cm. thick. Belongs to group with 4-merous flowers and very slender little branched inflorescences; I do not know all the species listed by Huber, Bol. Mus. Paraense 3: 244. 1902 (Harms). Small tree (4–10 meters) with white or lightly tinted flowers, or the calyx green. F.M. Neg. 18196.

Huánuco: Pozuzo, *Ruiz & Pavón*.—San Martín: Moyobamba, *Weberbauer 4770*.—Loreto: Flood-free woods, mouth of the Santiago, *Tessmann 4266*, type; also *4220; 4648*. Yurimaguas, *Killip & Smith 29090*.

Guarea Eggersii C. DC. Ann. Cons. Jard. Bot. Genève 10: 176. 1907.

Branchlets minutely puberulent, rubescently lenticellate (in herbarium); leaves alternate, type to 23 cm. long, with 5–7 pairs of rather long (to 15 mm.) petiolulate firm-membranous pellucid-puncticulate glabrous oblong-lanceolate leaflets, the larger to 12 cm. long, nearly 5 cm. wide, cuneately acute at base, acuminate, with 7–8 slightly arcuate secondary nerves; petioles 3.5–6 cm. long, complanate above, sparsely puberulent; flowering panicle simple, about 17 cm. long, the peduncle only 3–5 mm. long, puberulent; pedicels 1 mm. long; calyx puberulent with 4 rounded teeth, rubescent, 1 mm.

long; petals 4, oblong, obtusish acuminate, puberulent both sides, 7 mm. long, valvate; anthers 8–10, gynophore glabrous; style as ovary hirsute, the latter 4-celled.—Affine *G. subspicata* C. DC. according to the author. F.M. Neg. 14248.

Loreto: 1.5 meter tree with white and garnet flowers, Florida, *Klug 1981?* Ecuador.

Guarea eriorhachis Harms, Notizbl. Bot. Gart. Berlin 10: 244. 1928.

A slender unbranched tree bearing a crown of very large somewhat hirsute or villous leaves, the flowers in racemiform hirsute panicles on the trunk; petioles and leaf-rachis densely hirsute-villous, together 7 or 8 dm. long or even longer; leaflets 7 pairs, perhaps more, the hirsute petiolules 5–15 mm. long, oblong to lanceolate or oblanceolate, acute or obtusish at base, narrowly caudate at tip, chartaceous but rather rigid, glabrous or nearly above, sparsely pilose-hirsutulous especially on the many lateral nerves beneath, these prominent with the transverse veins; panicle rachis 9–11 cm. long, with short nearly deltoid acute bracts; calyx with 4 broad apiculate lobes or finally sometimes 2–3 parted, about 7 mm. high; petals 4 or 5, lanceolate-lingulate, acute, densely subsericeous hirsute without, 12–13 mm. long; staminal tube glabrous, truncate; anthers 8 or 9, muticous, included; ovary densely hirsute on glabrous stipe, the glabrous style with discoid stigma.—*G. trunciflora* C. DC. has larger bracts and smaller leaves with shorter pubescence (Harms). Type 5 meters high, the trunk 11 cm. in diameter, calyx greenish-yellow, petals whitish. It seems probable that this is the same as *G. Casimiriana* then the available name. F.M. Neg. 18197.

Loreto: Flood-free woods, mouth of the Santiago, *Tessmann 4450*, type.

Guarea filiformis [R. & P.] C. DC. Monogr. Phan. 1: 566. 1878.

Branchlets glabrous, rusty gray, elenticellate, longitudinally rugulose; petioles about 4 cm. long, somewhat tumid at base, concave above; leaves about 17 cm. long, with 3 pairs of shortly petiolulate firm opaque glabrous oblong- or ovate-elliptic leaflets, the upper about 13.5 cm. long, 5 cm. wide, the lower little smaller, ovate or elliptic, acute at both ends, the larger somewhat cuspidate at apex; secondary nerves ascending, arcuate, rather prominent beneath, about 8 on each side; panicles glabrous, simple, about as long as

the leaves, the cymules sessile; flowers pedicellate, with glabrous obtusely 4-dentate calyces; petals glabrous, valvate in bud, drying reddish, about 4 mm. long; tube cylindric, subentire; anthers 8, small, elliptic; ovary oblong, longer than the gynophore, attenuate into short style.—Certainly much like *G. silvatica* C. DC., 564, of the Upper Amazon, which is the somewhat earlier name, but that with broader leaflets, more flowers per cymule on longer pedicels. *G. syringoides* Wright (*G. microcalyx* Harms, fide author) of Ecuador has somewhat longer puberulent petals, calyx minute; Notizbl. Bot. Gart. Berlin 9: 429. 1925. The somewhat doubtful *Williams 4668* was from a tree 15 meters high with pale pinkish-brown moderately smooth and rather thin bark. F.M. Neg. 14399.

Huánuco: Pueblo Nuevo, *Ruiz & Pavón*, type.—Loreto: Yurimaguas, *Williams 4668?* Mishuyacu, *Klug 962*.

Guarea fissicalyx Harms, Notizbl. Bot. Gart. Berlin 11: 383. 1932.

Glabrous, except the very long axillary panicles; petioles 8–9 cm. long; leaflets 6–7 pairs (petiolules 5–7 mm. long), subchartaceous, lanceolate to ovate-oblong, acute or obtusish at base, acuminate, 13–19 cm. long, 4–5.5 cm. wide; panicles to nearly 4 dm. long, with many mostly 3-flowered shortly (3–7 mm.) peduncled cymules, the pubescent pedicels about 3 mm. long; calyx bifid in bud, later unequally trifid, 5 mm. long, the ovate lobes obtuse; petals 5 (or sometimes 4?), equal or one much broader, valvate, lingulate-lanceolate, densely sericeous, to 9 mm. long, 2.5 (–4) (4–5 in *Klug 240*) mm. broad; staminal tube truncate, glabrous, anthers 10–13, included, oblong-lanceolate, obtuse; gynophore glabrous, enlarged under the pilose ovary, the glabrescent style with glabrous peltate stigma.—Species perhaps marked by the calyx but the character possibly variable (cf. *G. trunciflora*, *G. Casimiriana*); type a tree 6 meters high. *Williams 1232* was 12 meters, bark reddish-brown, rough, inner fibrous, flowers creamy white, fruit khaki-colored when mature. The Klug specimen with detached broken inflorescence is entirely problematical but placed here with query by Harms himself. *Williams 1232* with a short fruiting inflorescence would also seem to be scarcely a reasonable "guess." It seems to me probable that the long spiciform inflorescence rather than the calyx may be the distinctive character among larger flowered species, and if so the other Williams specimens except for more oblong leaflets seem to be referable here.

Loreto: Florida, mouth of Río Zubineta, *Klug 2090*, type. Mishuyacu near Iquitos, *Klug 240?* Nanay, *Williams 1232*. San Antonio and Paraiso, Alto Río Itaya, *Williams 3484; 3323* (a new species? Harms). "Paujil-ruru," "latapi de hojas."

Guarea franciscoana C. DC. Notizbl. Bot. Gart. Berlin 6: 498. 1917.

Glabrous except the simple racemes, these in flower puberulent and with pale lenticels, to 4 cm. long in fruit, the peduncles 3 cm. long; leaves alternate, 13–16 cm. long, petiolules sulcate above, to 5 mm. long; leaflets 3–4 pairs, subobovate-oblong, acute at base, shortly and obtusely acuminate, subcoriaceous, pellucid-punctate, the upper to 16 cm. long, 6 cm. wide, with 9 secondary nerves, the lower more elliptic and much smaller; cymules 2–3-flowered, buds obovoid, puberulent, flowers greenish, with 8 anthers and a 4-celled ovary; cymules developing pyriform fruits, early hirsute becoming glabrous, elenticellate, dark red, 1.5 cm. long.—Type from a tree 10–20 meters high. Ex char. seems to be *G. macrobotrys* Poeppig from near Huánuco (Harms); *G. acreana* is probably the same if not *G. odorata* and *G. punctata*. F.M. Neg. 14400.

Río Acre: Seringal San Francisco, *Ule 9512*, type.—Loreto: Mouth of Río Santiago, *Tessmann 4338* (det. Harms).

Guarea grandifolia DC. Prodr. 1: 624. 1824; 553.

Branchlets rubescent; petioles 6 cm. long, canaliculate above; leaves about 3.5 dm. long, with 5–10 pairs of opposite ovate-oblong obtuse leaflets to 21 cm. long, 8.5 cm. wide, coriaceous, opaque, glabrous above, typically pubescent on the alternate prominent 10–15 nerves beneath the rachis of the younger yellowish-hirsute, sulcate above; panicles peduncled, cymules and flowers pedicellate, the former 1–4-flowered, the latter yellowish sericeous puberulent without, both the 4-dentate calyx and the fleshy acute petals, these about 1 cm. long; staminal tube glabrous, anthers oblong; ovary 7-celled, yellowish-sericeous.—After C. DC. Peruvian material seen has glabrous leaves except pulverulent midnerve; *Williams 2771* was from a 12 meter tree with grayish-brown bark, the inner coarsely fibrous or separating into long thin flakes, flowers pale yellow, fruit round, depressed above, reddish-brown when mature, with woody pedicel borne high on the trunk; fairly common in dense forest near boundary with Brazil. Either not in Peru typically or variable and then the earliest name for several if not all of the forms keyed below

it. The name was inadvertently written "grandiflora" by C. DC., 553. *G. mucronulata* C. DC., Notizbl. Bot. Gart. Berlin 6: 499. 1917, with 5 pairs of mucronulate glabrous leaflets, petals 5.5 mm. long is, fide Harms, *Carapa guianensis*.

Loreto: La Victoria, *Williams 2771* (det. Harms with query!). Mouth of Santiago, 8 meter tree, *Tessmann 4337* (det. Harms).—Huánuco: Shapajilla, 630 meters, *Woytkowski 18; 25* (both det. Standley). Mishuyacu, *Klug 65* (det. Harms, but essentially glabrous and flowers on trunk, fide collector!). French Guiana.

Guarea Guentheri Harms, Notizbl. Bot. Gart. Berlin 10: 243. 1928.

Branchlets, leaf-rachises and panicles more or less densely villosulous or puberulent-villous, the first glabrescent in age; leaves with petioles 1.5–4.5 dm. long with 2–4 or more pairs of opposite 4–8 mm. petiolulate oblong-lanceolate or somewhat obovate leaflets 6–22 cm. long, 4–8.5 cm. wide, acute to obtuse at base, shortly or minutely acuminulate, at maturity glabrous or nearly; panicles axillary or from the trunk and branches, elongate, the lowest branchlets 10 cm. long, gradually shorter, above the main rachis 10–27 cm. long, pedicels 1–3 mm. long; calyx obtusely and very broadly 4-lobed, puberulent, 3 mm. high; petals 4, lingulate, acutish, appressed puberulent without, 14–16 mm. long; staminal tube truncate or nearly, glabrous or glabrate, about 12 mm. high, anthers 8, sessile below margin, muticous; ovary long-stiped, densely pilose as style below, stigma broadly discoid.—Near the less pubescent and smaller-flowered *G. trichilioides* L. (Harms). Type 16 meters high with whitish-yellow flowers.

Loreto: Mouth of the Santiago, *Tessmann 4156*, type.

Guarea Huberi C. DC. Bull. Herb. Boiss. sér. 2. 6: 984. 1906.

Branchlets hirsute becoming glabrate, obscurely lenticellate; leaves moderately petioled, to 2.5 dm. long, with 4–5 pairs of firm-membranous epunctate (in Peru the younger minutely punctate) elliptic-lanceolate leaflets, glabrous above, typically appressed hirsute beneath on the nerves, rachises and petiolules (these 5 mm. long), acute at base, acutely acuminate, the larger upper to 16 cm. long, 7 cm. wide, the lower smaller and sometimes rounded apically; secondary nerves 10–12, subascending, nearly straight; panicles from the branches of the former year or older or rarely from base of leafy branchlets below the leaves, 3–4-parted from base, these slender

spiciform hirsute branches about 7 cm. long, 1 mm. thick; pedicels 1.5 mm. long; calyx 1 mm. long, cupulate, 4-rounded-dentate, sparsely hirsute; petals 4, apex shortly attenuate, acutish, pale rose, 7 mm. long, 1.5 mm. wide, not at all densely appressed hirsute, the tube nearly as long and glabrous as the 7 anthers; ovary 4-celled, the cells 1-ovuled; style glabrous.—The Peruvian specimens from a 5–6 meter tree with white or yellowish flowers apparently differ in having the upper leaflets smaller, less hirsute, and may be noted as var. **peruviana** Macbr., var. nov., planta glabrior; petalis 5–6 mm. longis; tubo vix integro. F.M. Negs. 14408; 26962.

Loreto: Mishuyacu, near Iquitos, *Klug 81* (type, var. *peruviana*); also *Klug 34*. Brazil.

Guarea Jelskiana (Harms) Macbr., comb. nov. *Ruagea Jelskiana* Harms, Notizbl. Bot. Gart. Berlin 9: 426. 1925.

Glabrous even to the flowers (except the puberulent sepals); petioles 4–8 cm. long; leaflets 2–3 pairs, oblong to obovate, little or scarcely narrowed to the short (3–6 mm. long) or obsolete petiolule, the terminal one long-attenuate and -petiolulate, all often shortly acuminate, 4–10 cm. long, 2.5–4.5 cm. wide, chartaceous or subcoriaceous, densely and minutely punctate beneath, the 10–15 or more lateral nerves hardly conspicuous either side; panicles axillary, to 9 cm. long or longer, the lower branchlets 1–1.5 cm. long, pedicels 1–1.5 mm. long; sepals 5, roundish, minute; petals 5, oblongish, rounded at tip, 4.5–5 mm. long; staminal tube entire or obscurely 10-crenulate, anthers 10, included; disk stipitiform; ovary glabrous, stigma peltate, exserted.—Distributed as *G. punctata* C. DC.; near *Ruagea Augusti* Harms with smaller lanceolate leaflets (Harms).

Cajamarca: Tambillo, *Jelski 320*, type.

Guarea Klugii Harms, Notizbl. Bot. Gart. Berlin 11: 384. 1932.

Glabrous except for a little pubescence in the flowers; petioles 3–6 cm. long; leaves with 2 pairs (terminal fallen or aborted?) of shortly petiolulate (5–7 mm.) oblong or ovate-oblong leaflets, often acute at base, obtusely acuminate, papyraceous or subchartaceous, green in herb., with 5–8 arcuate-ascending lateral nerves prominent beneath; panicles lax, 8–13 cm. long, cymules 1–3-flowered on peduncles 1–3 mm. long, the pedicels 3–5 mm. long; calyx broadly 4-crenulate, glabrous, 2.5–3 mm. high; petals 4, lingulate, obtuse, very sparsely canescent within, 7 mm. long; staminal tube subentire, lightly pulverulent above, with 8–10 sessile barely if at all exserted

anthers, these with truncate basal appendage; ovary shortly stiped, glabrous, narrowed to style, 2-celled (cells 2-ovuled, 4 ovules seen?), the stigma fleshy discoid.—Distinctive among American species by the green colored leaves in the herbarium; recalls *G. Duckei* C. DC. of Pará with more leaf-nerves and smaller calyx (Harms). But much more material is needed to prove the distinctness of this and other similar forms from *G. pedicellata* C. DC., 565. Type a tree of 10 meters.

Loreto: Mishuyacu, near Iquitos, *Klug 630*, type. Florida, *Klug 2300* (det. Standley).

Guarea Kunthiana Juss. Mém. Mus. Hist. Nat. Paris 19: 241. 1830; Mém. Méliac. 138. 1830; 561. *G. densiflora* Poepp. in Poepp. & Endl. Nov. Gen. & Sp. 3: 40. 1845? *G. Poeppigii* Tr. & Pl. Ann. Sci. Nat. sér. 5. 15: 371. 1872.

Branches glabrate, dark reddish; leaves about 16 cm. long; leaflets 2–5 pairs, opposite, minutely petiolulate, glabrous, typically coriaceous, ovate-elliptic or oblong-elliptic, more or less acute at base, shortly and obtusely acuminate, 13–16 cm. long, 5–6 cm. wide, the secondary nerves alternate, spreading-ascending, 9–12 each side; petioles 5–6 cm. long, sulcate above, the younger minutely puberulent; panicles to half as long as the leaf, pyramidately branched, branches complanate or angled, finely reddish puberulent, the pedicelled cymules with 1–3 pedicellate flowers; calyx puberulent, shortly and acutely 4-dentate; petals 4 or 5, densely fulvescent sericeous, 8–9 mm. long, 3 mm. wide, subcoriaceous, valvate in bud, oblong, acute; tube subovate-cylindric, subcontracted at two-thirds the length, lineately puberulent, subentire; anthers 8–10, oblong; ovary glabrous, 4-costulate, shorter than the style, 4-celled, cells 2-ovuled; capsule subpyriform, about 3 cm. long, glabrous, dark reddish and with a few pale round lenticels.—The Peruvian form fide C. DC. is var *densiflora* (Poepp.) C. DC. a tall tree, the leaflets merely firm, oblong-elliptic, equally cuneate-acute at base, 16–17.5 cm. long, 6–7.5 cm. wide; stamen tube glabrous.—Ten meter tree, bark reddish-brown, heartwood red, sapwood white, leaves dark green, thick, soft, leathery, number *24* at least with pungent odor (Woytkowski). F.M. Negs. 14409 (var.); 26464.

Huánuco: Shapajilla, 630 meters, *Woytkowski 27; 24* (both det. Standley).—Loreto: Maynas, *Poeppig 2377 B* (type, *G. densiflora*). *Ruiz & Pavón*, without locality. Guianas; Martinique.

Guarea leticiana Harms, Notizbl. Bot. Gart. Berlin 13: 505. 1937.

Leaf-rachises 3 dm. long or longer, puberulent or glabrescent (as younger leaves on nerves) with 5 pairs of petiolulate (3–5 mm.) chartaceous oblong or obovate-oblong leaflets, 15–18 cm. long, 5–7 cm. wide, often narrowed at base, acuminate or acuminulate, the lateral nerves 10–12; panicle axillary (?), broadly pyramidal, laxly branched, many-flowered, 13–15 cm. long with the short peduncle, sparsely puberulent or glabrate, the lower branchlets 5–6 cm. long, the very short uppermost only 2–5-flowered; pedicels slender, articulate, nearly 3 mm. long; calyx in bud truncate, breaking irregularly into 4 segments, puberulent, 1.5–2 mm. high; petals 4, ashy pubescent in bud, 8–8.5 mm. long; staminal tube sparsely puberulous or glabrate, subtruncate or lightly crenulate; anthers 8; ovary hirsute.—Resembles *G. trichilioides* closely but the pedicels elongate, the petals less densely pubescent. Omitted by Williams in his account of the trees of northeastern Peru.

Loreto: Leticia, *Williams 3172*, type. Florida, *Klug 1988*.

Guarea macrobotrys Poepp. in Poepp. & Endl. Nov. Gen. & Sp. 3: 40. 1845; 567.

A weak tree scarcely 2 meters high with a few lax branches, the younger branchlets finely pulverulent; leaves 4 dm. long or longer; leaflets 5–6 pairs, oblong, obtuse, acute at base, opaque, finely puberulent on nerves beneath, about 15 cm. or longer, nearly half as wide; panicles solitary, pendulous, to 4 dm. long or longer, very lax; flowers pedicellate in dense alternate fascicles in simple racemes; petals roseate, pulverulent; ovary glabrous.—This may well be the earliest name for all the Peruvian trees with subsimple pendulous panicles in case the differences upon which several names have been proposed are shown to be unimportant, taxonomically. It may be recorded that the leaf rachises, as to types, are rather distinctly rough, that is, verruculose-punctate, for *G. macrobotrys, G. punctata, G. maynasiana, G. franciscoana, G. acreana*, while not manifestly so for *G. filiformis, G. Klugii*. The Mexia specimen has 7 pairs of leaflets, the larger 2.5 dm. long, nearly 1 dm. wide. Killip & Smith specimen with smaller leaflets probably belongs to one of the segregates; the long fruiting rachises bear near tips a few obovoid brown-puberulent strongly verrucosely ribbed fruits, the larger 1.5 cm. long, nearly as thick near the top.

Huánuco: Pampayacu, *Poeppig*, type.—Loreto: Creek Inche above Pongo de Manseriche, *Mexia 6373?* (det. Standley, *G. grandifolia*).—Junín: Cahuapanas on Río Pichis, *Killip & Smith 26793*.

Guarea maynasiana C. DC. Monogr. Phan. 1: 550. 1878.

Branchlets clay-colored, glabrous; petioles 5 cm. long, subterete; leaves at least about 3 dm. long with 4 or probably more pairs of shortly petiolulate glabrous subcoriaceous leaflets, acute at base, acutely cuspidate, 14 cm. long, 5 cm. wide; secondary nerves alternate, ascending, 6–8 on each side; panicles shorter than the leaves at least as to type, with 1–3-flowered pedicellate cymules, the flowers pedicellate; calyx membranous, acutely 4-dentate, pubescent without, the petals fulvescent sericeous, about 3 mm. long, oblong, acutely acuminate; tube cylindric, subentire, a little contracted beneath the throat; anthers oblong; ovary ovoid, densely yellowish hirsute as the quite as long style, equaling the gynophore, 4-celled, the cells 1-ovuled.—Williams collections from small trees or tall shrubs 3–6 meters, bark light tan to reddish-brown, fruit ovoid, dark brown with small red seeds; Killip & Smith tree, 20 meters high. According to Harms panicles axillary on leafy branches. It seems to me to be the earlier name for *G. acreana* and both as far as I know may be a part of *G. macrobotrys*.

Loreto: Upper Maynas, *Poeppig*, type. Pebas, *Williams 1740; 1752* (det. Harms).—San Martín: Tarapoto, *Williams 6537*? Santa Rosa, *Killip & Smith 28968* (det. Killip). Río Mazán, *José Schunke 189* (det. Standley). "Cuquindo" (Schunke).

Guarea microsepala (Harms) Macbr., comb. nov. *Ruagea microsepala* Harms, Notizbl. Bot. Gart. Berlin 10: 242. 1928.

Much like *G. Tessmannii* but more pubescent, the 5–12 leaf-nerves minutely pilose and rather prominent beneath, the oblong or somewhat obovate leaflets only 2–4 pairs and mostly much larger, 6–21 cm. long, 3.5–8.5 cm. wide; panicles 4–9 cm. long, more or less pilose-puberulent, the whitish or faintly roseate flowers glomerulate; sepals 4, free, or nearly free or rarely connate to the middle, acutish, nearly 1 mm. long; petals 4, acutish, appressed pubescent, 8 mm. long; anthers 8; ovary densely hirsute.—Tree, the type 12 meters high, the calyx carmine, the petals and tube whitish or early roseate. The variation in sepal-connation suggests the weakness of the character, basic for *Ruagea*.

Loreto: Flood-free woods, Puerto Meléndez below the Pongo de Manseriche, *Tessmann 4772*, type.

Guarea oblongiflora C. DC. Ann. Cons. Jard. Bot. Genève 10: 141. 1907.

Younger branchlets hirtellous as the leaflets beneath and panicle branches; leaflets 4–5 pairs, obovate-lanceolate, acute at base, shortly and acutely acuminate, firm, opaque, glabrous above, to 2.5 dm. long, 11 cm. wide; lateral nerves each side 10–12; panicles little shorter than the leaves, lax, pyramidately branched, the lower branches about 8 cm. long; pedicels 3 mm. long; buds oblong; flowers lemon-yellow, calyx cupulate, 4-dentate, appressed hirtellous without; petals 4, densely yellowish hirsute without, oblong, subattenuate to the truncate base, shortly acuminate and acute, coriaceous, 12 mm. long, 3.75 mm. wide; staminal tube 9 mm. long, glabrous, ovate-cylindric, entire; anthers 8, oblong, 2 mm. long; gynophore glabrous, sulcate; stigma short-cylindric; ovary longer than gynophore, glabrous, sulcate, 4-celled, the ovules 2, superposed.—F.M. Neg. 14412 (on which I wrote, in error, "*oblongifolia*").

Junín: Chanchamayo Valley, Prov. Tarma, in open wood, 1,000 meters, *Weberbauer 1923*, type; 282. Cahuapanas on Río Pichis, 340 meters, *Killip & Smith 26803*.

Guarea odorata C. DC. Bol. Mus. Paraense 3: 239. 1901.

A small nearly glabrous tree with fragrant white flowers borne in simple pendulous panicles about as long as the leaves; branchlets elenticellate, drying rubescent; leaves with petioles about 22 cm. long, petioles 6 cm. long, petiolules nearly 1 cm. long; leaflets 4 pairs, opposite, acute at base, shortly and obtusely acuminate, firm, opaque, pellucid-punctate, the larger upper ones to 23 cm. long, 7 cm. wide, medial to 16 cm. long, 6 cm. wide, lower more elliptic ones about 9 cm. long, 4 cm. wide; peduncles 1 cm. long, pedicels 0.5 mm. long, the spicately disposed cymules 3-flowered, glabrous including the rounded 4-dentate calyx, the 4 narrowly oblong subacuminate petals minutely appressed puberulent without, valvate in bud, nearly 8 mm. long, scarcely 1.5 mm. wide, drying rubescent; tube glabrous, entire, 7 mm. long; anthers elliptic, little exserted from the tube, glabrous; ovary hirsute, 4-celled, equaling the apically torulose gynophore, the nearly glabrous terete style a little longer than the ovary and with a fleshy orbicular stigma.—Section *Euguarea*, and according to the author affine his *G. Mikaniana* of eastern Brazil.

The type is given in the Gray Herbarium Card Index as from Brazil.

Loreto: Stream border, Cerro de Canchahuaya, Río Ucayali, (*Huber 1463*, type).

Guarea pilanthera C. DC. Repert. Sp. Nov. 19: 55. 1923. *Ruagea pilanthera* (C. DC.) Harms, Notizbl. Bot. Gart. Berlin 9: 428. 1925.

Branches, leaves both sides but especially beneath and panicles hirsute or hirsutulous; leaves alternate, to 37 cm. long, imparipinnate, the petioles and rachises 5 cm. long, petiolules nearly 2 mm. long; leaflets 8 pairs, the lower opposite, the upper alternate, elliptic, rounded to base and apex but the latter acuminulate, the medial to 17 cm. long, 5 cm. wide, lower 7 cm. long, 5 cm. wide, coriaceous, the lateral nerves 16–18; panicles axillary, about 15 cm. long, the peduncles and branches 2.5 cm. long, the latter spicately flowered nearly to base; sepals and petals 5, both glabrous above and ciliate, the former rounded, 1 mm. long, the latter obovate-oblong, rounded at tip, puberulent below, 5 mm. long, to 2 mm. wide; staminal tube glabrous except the ciliolate obtuse teeth, the 10 anthers dorsally pilose; gynophore glabrous, the sparsely pilose longer ovary 3-celled, 2-ovuled, style glabrous, stigma orbicular.—Nearly *G. hirsuta* C. DC. of Ecuador (Harms) with peduncles to 12 cm. long, sepals densely puberulent, petals glabrous, 12 mm. long, ovary glabrous, cells 1-ovuled, stigma cylindric. Shrub-tree, 4 meters high, flowers greenish.

Ayacucho: Prov. Huanta, Tambo to near Osno, 2,500 meters, *Weberbauer 5656*, type.

Guarea pterorhachis Harms, Notizbl. Bot. Gart. Berlin 9: 141. 1924.

Glabrous except the long slender lax minutely puberulent panicles; petioles narrowly winged, 6–11 cm. long; leaflets apparently (in type) 2 pairs, oblong-lanceolate-oblanceolate, often narrowed to rounded or obtuse base, sessile or to 7 mm. petiolulate, shortly or rather long-acuminate, often cuspidate (acumen then 1.5–2 cm. long), drying papyraceous or subchartaceous, 11–22 cm. long, 5–8 cm. wide, the 5–10 lateral nerves moderately prominent both sides, arcuate-ascending to the lightly undulate margins, the narrowly winged rachises 5–6 mm. wide; lateral cymules 5–20 mm. long, pedicels 2–3 mm. long; calyx broadly 4-lobed, nearly 3 mm. across,

the lobes obtuse; petals 4, lingulate-oblong, 3 mm. long, sparsely puberulent without, most minutely or obscurely within; staminal tube subentire, 2.5 mm. high, the 8 small sessile anthers included; ovary sessile, the very broad disk stipitiform, glabrous as the stout style and stigma; ovules 2, superposed.—Remarkable in the winged leaf rachis and the slender loose inflorescence (Harms). A small tree, the trunk about 3 cm. in diameter, the flowers white. Leaves leathery, dark green, paler beneath (Woytkowski); this specimen with 3–4 pairs of leaflets. A detached immature fruit with Killip & Smith specimen is globose, glabrous, verruculose, about 1 cm. in diameter. F.M. Neg. 14415.

Ayacucho: Kimpitiriki, 400 meters, Río Apurímac Valley, *Killip & Smith 22897*.—Loreto: Virgin forest on the middle Ucayali, *Tessmann 3164*, type. Shady forest, Boquerón del Padre Abad, *Woytkowski 34482*.

Guarea punctata C. DC. Monogr. Phan. 1: 575. 1878.

Branchlets yellowish gray, glabrous, elenticellate; petioles 4–7 cm. long, subterete; leaves about 2.5 dm. long with 4–6 pairs of opposite petiolulate rather firm opaque pellucid-punctate elliptic leaflets, equally cuneate-acute at base, subobtusely cuspidate, the upper about 12.5 cm. long, 4.5 cm. wide, the lower smaller, more elliptic; secondary nerves ascending-subarcuate, rather prominent beneath, about 8 each side; rachis subterete, glabrous; fruiting panicles many times shorter than the leaves, the immature puberulent rugulose capsules about 3 cm. long, 2 cm. broad, the cells biovuled.—The punctae are nearly oblong, the capsules obovoid. F.M. Neg. 14416.

Huánuco: In the mountains about Pozuzo and Chinchao, *Ruiz & Pavón*, type.

Guarea purpurea C. DC. Monogr. Phan. 1: 564. 1878.

Branchlets early yellowish hirsute, finally glabrous, elenticellate; rachis glabrous, sulcate above, with the petioles 2.5 cm. long; leaves about 1 dm. long, shortly petioled, with 4 pairs of opposite subsessile subcoriaceous epunctate narrowly oblong leaflets, the upper to 14 cm. long, 4 cm. wide, acute both ends, glabrous and lustrous above, pilose on midnerve beneath, purplish but drying yellowish, the secondary nerves ascending, nearly straight, prominent beneath, about 12 pairs; panicles shorter than the leaves, yellowish hirsute, the lower branches scarcely 2 cm. long; flowers rather congested,

subsessile; calyx acutely 4-dentate, hirtellous without, membranous; petals drying reddish, oblong, acute, 6 mm. long, 4 mm. wide, sparsely puberulent with appressed yellowish trichomes; tube acutely denticulate, lightly and retrorsely puberulent-pilose; ovary glabrous. —Allied to *G. Kunthiana* Juss. Data not given by the author but "Peru" according to Harms and probably based on the unpublished "*purpurea*" of Ruiz and Pavón's journal, English edition, 177, under native name "yechenor"; used "by Indian women to dye their wools and cottons a violet color." Here might be sought *G. Huberi* C. DC., Bull. Herb. Boiss. sér. 2. 6: 984. 1906, with 4–5 pairs of lanceolate leaflets (larger 16 cm. long, 7 cm. wide), appressed hirsute on nerves beneath; calyx 1 mm. long, ovary hirsute; Río Purús, Brazil.

Junín: Hacienda Schunke, La Merced, *5686?* Without data, *Ruiz & Pavón*, type; cf. note above.

Guarea Raimondii (Harms) Macbr., comb. nov. *Ruagea Raimondii* Harms, Notizbl. Bot. Gart. Berlin 11: 385. 1932.

Younger branchlets shortly hirsutulous; petioles 2.5–3 cm. long, puberulent, villous-pilose as the rachises, leaves beneath, panicles including the calyces; leaves imparipinnate, 6–12 cm. long (with petiole), the opposite or subopposite leaflets in 2–4 pairs, more or less petiolulate, obovate-oblong, narrowed or obtuse at base, obtuse or rounded and shortly apiculate at apex, 3–6.5 cm. long, 2–3 cm. wide or wider, somewhat lustrous and nearly glabrous above; panicle in type 6–7 cm. long, many-flowered; calyx 1–1.5 mm. high; corolla 5 mm. long or longer, glabrous.—Resembles the glabrous *G. Jelskiana* (Harms) Macbr.

Cajamarca: Montaña del Nanchó, *Raimondi 5141*, type.

Guarea simplicifolia C. DC. Notizbl. Bot. Gart. Berlin 6: 499. 1917.

Unusual as the name indicates the leaves reduced to the terminal leaflet; branchlets elenticellate, glabrous; petioles pulverulent, 3.5 cm. long, petiolule 5 mm. long bearing the cuneate-based acute or acuminate elliptic-lanceolate leaf-blade, the larger more than 2 dm. long, 9 cm. wide, membranous, pellucid-puncticulate, minutely and sparsely puberulent above, glabrous beneath, with 10 spreading-arcuate secondary nerves; panicles axillary, nearly as long as the petioles, 2.5 cm. in flower, the branches to 1 cm. long, spicately cymulose, cymules 1–2-flowered; flowers whitish-yellow, pedicellate,

the cupulate calyx 4-denticulate, puberulent only without as also the 4 oblong-ovate acute petals, the former 1 mm. long, the latter 7 and 2 mm. wide; staminal tube glabrous, crenate, with 8 linear glabrous anthers 1 mm. long affixed a little above the base; glabrous ovary much longer than the glabrous gynophore, 4-celled, the glabrous style with very short stigma.—Shrub 1–2 meters high. F.M. Neg. 14423.

Río Acre: San Francisco, *Ule 9509*, type. Brazil.

Guarea subsetulosa Harms, Notizbl. Bot. Gart. Berlin 13: 506. 1937.

A small sparsely branched tree the branchlets early subsetulose or hirsute, finally glabrate; petioles with rachises 1–2 dm. long, laxly hirsute or glabrate; leaflets 1–3 pairs, subsessile, oblong or suboval to lanceolate-oblong, 2–2.5 dm. long, 6.5–9 cm. wide, narrowed to the often cuneately acute base, rather long-acuminate, papyraceous, glabrous or nearly above, and with scattered long subsetulose trichomes beneath, the arcuate-ascending lateral nerves prominent; panicles fasciculate from the branchlets, the hirsute nodulose rachises 1–2 cm. long; pedicels 2–3 mm. long, spreading pilosulous as the subentire calyx, this 1.5–2 mm. long; petals 4 or 5, densely appressed pilose, 6–7 mm. long; staminal tube glabrous, the 8–9 anthers included; ovary broadly stiped, glabrous as the style, the stigma depressed-capitellate.—A distinctive species, 2–3 meters tall, the trunk 2–3 cm. in diameter, the flowers only on the slender branches, the calyx green, petals bright green to bright yellow.

Loreto: In rain forest, mouth of the Santiago, upper Marañón, *Tessmann 4130*, type; also *4501*.

Guarea subviridiflora C. DC. Repert. Sp. Nov. 18: 448. 1922. *Ruagea subviridiflora* (C. DC.) Harms, Notizbl. Bot. Gart. Berlin 9: 428. 1925.

Completely glabrous except the sepals a little puberulent at base and ciliolate; leaves imparipinnate, the rachises and petioles 5 cm. long, subterete, petiolules 2 mm. long; leaflets 5–6 pairs, elliptic-lanceolate, acute at base, shortly and obtusely acuminate, to 11.5 cm. long, nearly 5 cm. wide, the lower gradually smaller, the lateral nerves as many as 18 on each side; panicles to 7 cm. long with peduncles about 2–2.5 cm. long, branchlets to 8 mm. long, pedicels very short; flowers greenish, the rounded sepals 2 mm. long; petals 5, obovate-oblong, 7 mm. long, 3 mm. wide; staminal tube with 10

acute teeth; stigma short, cylindric.—Near *G. Weberbaueri* but fewer leaflets (Harms). Type a tree 10 meters high. F.M. Neg. 26478 (2 detached leaflets).

Cuzco: Valle de Santa Ana, 2,800 meters, *Weberbauer 4984*, type.

Guarea Tessmannii (Harms) Macbr., comb. nov. *Ruagea Tessmannii* Harms, Notizbl. Bot. Gart. Berlin 10: 241. 1928.

Glabrous or essentially except the minutely pulverulent calyces and petals; leaves imparipinnate, 2.5–4 dm. long or longer, with 8–12 pairs of opposite 1–3 mm. petiolulate leaflets, these mostly lanceolate or oblong-lanceolate, often oblique at the obtuse to acutish base, obtusish or obtusely acuminulate, 5–14 cm. long, 2–3.5 cm. wide, papyraceous, the many (more than 10) lateral nerves little prominent beneath; panicles many times exceeding the coma of leaves but below new leaves or buds (from axils of fallen leaves?), 4–17 cm. long, narrow, the sparsely branched branchlets 5–15 cm. long and more or less puberulent; sepals 5, minute, semiorbicular, free or nearly; petals 5, oblanceolate, very sparsely pulverulent, nearly 5 mm. long; staminal tube slightly crenulate, anthers 10, sessile below margin, subincluded; ovary stoutly stiped, glabrous, the stigma broadly discoid.—A tree to 30 meters high with trunk a meter or more in diameter, the flowers green or partly yellowish. Recalls greatly certain species of *Cabralea* but lacks the discal tube (Harms).

Loreto: Flood-free woods mouth of the Santiago, *Tessmann 4029*, type; also, *4550*. Mouth of the Río Apaga, *Tessmann 5010*.

Guarea trichilioides L. Mant. 2: 228. 1771; 543. *G. Rusbyi* (Britton) Rusby, Mem. Torrey Club 6: 17. 1896?

A glabrous (except for the sericeous pubescent flowers) tree, the dark reddish branchlets pallidly lenticellate; leaves shortly petioled, to 4 dm. long, with (4) 6–10 pairs of opposite petiolulate firm opaque sparsely pellucid-punctate elliptic- or obovate-oblong or elliptic-lanceolate leaflets, rather equally acute at base, shortly and subobtusely cuspidate, (8) 14–30 cm. long, (2.5) 5.5–8 cm. wide; secondary nerves, alternate, spreading-ascending, 12–14 on each side; rachis with the petiole about 3 cm. long; panicles subpyramidate, elongate, little shorter than the leaves, shortly peduncled, the 1–8-flowered cymules pedicellate, the flowers nearly three times longer than the pedicels; buds subtetragonous, oblong; calyx segments

4, rounded obovate, bidenticulate or obtuse; petals thick-membranous, subovate-oblong, acute, 5–6 (8) mm. long, glabrous within; tube cylindric, 8-crenulate or subentire, contracted at two-thirds the length; anthers oblong; ovary sericeous, the style pubescent, about as long; capsule obovoid-pyriform, 1–2 cm. across, glabrous, reddish with pallid lenticels or smooth and nearly concolor, the orange-colored seeds 1 in each cell, ellipsoid.—Weberbauer and Burgos found a tree 20 meters high, Williams twice as tall.—Illustrated, Cav. Diss. 7: *pl. 210*; Mart. Fl. Bras. 11, pt. 1: *pl. 55* (fruit).

This rather common species with a trunk development of about 10 meters is sometimes in commerce according to Ducke as "Cedro branco," the wood resembling that of *Cedrela* a little in color and odor, this however very weak. Burgos noted it employed in carpentry, Williams in cooperage (at Tarapoto). Weberbauer found the crushed leaves and fruits used medicinally; actually, the bark is known pharmaceutically as Cocillana, the seeds supply an oil, and an alkaloid Rusbyine has been isolated; cf. note above under the generic description and Harms, Pflanzenfam. ed. 2. 19bI: 131 and 134. Except as indicated determinations mostly by Harms.

San Martín: Zepelacio, *Klug 3481* (det. Standley). Valley of the Río Mayo, 860 meters, (*Weberbauer 4581*, det. C. DC.); 288. San Roque, *Williams 7314*. Tarapoto, *Williams 6184*.—Huánuco: Shapajillo, 630 meters, *Woytkowski 22?* (sterile). Tingo Maria, 630 meters, *Burgos 31* (det. Standley, *G. grandifolia?*). Pampayacu, *Sawada 12*. Pozuzo, *Ruiz & Pavón*. Río Monzón, *Weberbauer 6309; 4470* (det. C. DC.).—Junín: La Merced, *5444*. Puerto Yessup, *Killip & Smith 26302?* (immature).—Loreto: Balsapuerto, *Klug 2998* (det. Standley). Yurimaguas, *Williams 4722; 4988; Killip & Smith 29023?* (fruits detached). Fortaleza, *Klug 2806* (det. Standley). Leticia, *Williams 3160*.—Madre de Dios: Iberia, Miraflores, *Seibert 2134*.—Río Acre: Seringal Auristella, *Ule 9514*. Río Macauhán, *Krukoff 5670*. Antilles, Central America to Bolivia and Brazil. "Requía," "atapio," "latapi," "latapi-caspi."

Guarea trunciflora C. DC. Monogr. Phan. 1: 571. 1878. *Carapa sericea* Poepp. in Poepp. & Endl. Nov. Gen. & Sp. 3: 39. *pl. 245*. 1845, not *G. sericea* (Blume) Spreng. 1827.

A tree with ample leaves and much shorter simple densely yellowish tomentose panicles borne in the axils of fallen leaves directly from the trunk or branches; leaves to several dm. long with 3–6 pairs of opposite subsessile subcoriaceous oblong-elliptic leaflets,

acutely cuspidate at tip, glabrous above, velvety puberulent beneath, 2 dm. long, 7 cm. wide; secondary nerves alternate, ascending, prominent beneath, about 16 each side; rachis tetragonous, tomentose; cymules pedicellate, 1–3-flowered; flowers sessile, tribracteate, the coriaceous sericeous calyx irregularly 2, 3 or 4-parted, the segments often 2-dentate; petals 4 in type, but 5 or 6, densely sericeous, coriaceous, oblong, acuminate, about 8 mm. long; tube cylindric, obtusely 8–10-crenulate, glabrous; anthers 8–10, oblong, sessile a little below the middle; ovary densely yellowish hirsute, 4-celled, longer than the gynophore; style hirsute; ovules 2 in type or solitary. —The above synonomy is after Harms and the species probably includes *G. fissicalyx*, *G. Casimiriana*(?). The leaves of the Schunke tree (10 meters, flowers white, fruit red) are larger than in type, finely and rather sparsely pubescent beneath, petals 4, 10 mm. long but probably belongs here. F.M. Neg. 14430.

Loreto: In upper Maynas, *Poeppig 2003*, type. Gamitanacocha, Río Mazán, *José Schunke 249* (det. Standley).—Junín: Puerto Bermudez, fruit dull red, *Killip & Smith 26506?*

Guarea Ulei Harms, Ann. Cons. Jard. Bot. Genève 10: 148. 1907.

Similar in foliage to *G. oblongiflora* but the panicles not axillary but borne directly on the trunk, and not open but merely bifid a little above the base, the simple branches spiciform, about 6 cm. long, the cymules 1-flowered; leaflets 5 pairs, hirtellous or villous on the 14–15 nerves above as well as beneath (pubescence softer), minutely pellucid-punctate, to 28 cm. long, 8 cm. wide; calyx 2–3-dentate the rounded teeth often bidenticulate; petals appressed hirsute without, nearly 4 mm. long; anthers linear-oblong, 1 mm. long; ovary hirsute, style glabrous with cylindric-orbicular stigma.—Specimen recorded from Peru, data lost. Thought by Harms to be allied to *G. Casimiriana* which see above, but except for the smaller flowers (maybe young?) seems too near *G. trunciflora*. F.M. Neg. 14431.

Peru: (probably). Amazonian Brazil.

Guarea Weberbaueri C. DC. Ann. Cons. Jard. Bot. Genève 10: 149. 1907. *Ruagea Weberbaueri* (C. DC.) Harms, Notizbl. Bot. Gart. Berlin 9: 428. 1925.

Branchlets glabrous with a few reddish lenticels; leaves moderately petiolate, abruptly pinnate, with 12–15 pairs of opposite or

alternate lanceolate leaflets, these 9 cm. long, 32 mm. wide, the younger puberulent above finally glabrous, opaque, coriaceous, the secondary nerves about 20 on each side; petiolules to 1 mm. long; rachises costate above; panicles scarcely half as long as the leaf, shortly peduncled, pyramidately branched, the lower branches 5.5 cm. long, floriferous nearly to base, the flowers shortly pedicelled, the buds obovate-oblong; sepals and petals 5, the former rounded, appressed puberulent and ciliolate, the latter glabrous, obovate-oblong, rounded at tip, subcoriaceous, 6 mm. long, half as wide; staminal tube glabrous, ovate-cylindric, crenulate at margin, the connective of the elliptic anthers produced into a short hirtellous appendage; gynophore short, glabrous, costulate, the longer ovary 3-celled, the cells 1-ovuled, the glabrous style with fleshy orbicular stigma convex above.—Marked by the many pairs of glabrous leaflets (Harms).

Cajamarca: Near Hualgayoc, Chugur, 2,900 meters, *Weberbauer 4094;* 259.

7. CABRALEA Juss.

Trees, the Peruvian with pari- or imparipinnate alternate leaves, the leaflets entire, often inequilateral at base, the upper ones gradually larger, either pellucid or epunctate, the punctae when obvious mostly sinuous. Flowers hermaphrodite in axillary panicles, the sepals and petals normally 5, the latter much the longer, free and strongly imbricate in bud. Stamen tube little shorter than petals, rarely entire, 10-antheriferous below apex. Disk subcampanulate, connate, more or less, below with the ovary and tube the former 4–5-celled attenuate to style with discoid stigma and sulcate or tuberculate. Ovules usually 2, superposed. Fruit coriaceous or ligneous, often indehiscent; seeds often pseudo-arillate.

The genus is named for the discoverer of Brazil, Pedro Alvarez Cabral, who was born about 1460.

Cabralea Poeppigii C. DC. Monogr. Phan. 1: 471. 1878.

Leaves with 2 pairs of opposite subsessile oblong-elliptic membranous subopaque finely or obscurely pellucid-punctulate glabrous leaflets about 17 cm. long, 6 cm. wide, equal and acute at base, long- and acutely-cuspidate at tip, smooth above, the secondary nerves moderately spreading, about 25 on each side, nearly straight, bifurcate before the margin; rachis terete, glabrous; panicles ample, compound, branched; flowers very shortly pedicelled; calyx appressed

puberulent without, the rounded membranous sepals ciliate; petals membranous, subelliptic-oblong, acute, about 6 mm. long, the staminal tube about one-third shorter, glabrous, ovate-cylindric, inflated below, acutely lacinulate; disk tube broadly cylindric, entire; anthers affixed dorsally a little above the base, sessile, glabrous, about 1 mm. long; ovary densely hirsute, style glabrous and with the stigma as long as the tube.—Type imperfect. The dried leaves are much lighter brown beneath. F.M. Neg. 32394.

San Martín: Tocache, *Poeppig 2038D*, type.

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